REPORT

OF

THE SUBURBAN TRAIN

(BOMBAY, CALCUTTA & MADRAS)

OVERCROWDING ENQUIRY COMMITTEE, 1956.

1—1 D. T. (Rly. B.d.) 56.

PERSONNEL OF THE COMMITTEE.

Shri B. B. Varma, Retired General Manager of Indian Railways.	*Chairman.*
Shri A. C. Chatterjee, Retired General Manager of Indian Railways.	*Members.*
Shri K. M. Rau, Retired Controller of Stores of Indian Railways.	
Shri K. Sambamurti.	*Secretary.*

CONTENTS

Chapter	Particulars	Paragraph	Page
I	INTRODUCTORY	101-117	1-5
	Appointment of the Committee and Terms of Reference	101	1
	Scope of the Enquiry	102-104	1-2
	Procedure of the Committee and Tours of Inspection	105-106	2
	Need for Reliable Statistical Data	107-111	2-4
	Time-Space-Speed Studies	112	4
	Plan of the Report	113-115	5
	Train Charts	116	5
	Census Charts	117	5
II	BOMBAY SUBURBAN RAILWAY SYSTEM	201-292	6-24
	Bombay Terminals	201-202	6

Western Railway

Chapter	Particulars	Paragraph	Page
	Suburban Sections	203-210	6-7
	Composition of suburban trains	211-214	7
	Journey time of trains on various sections	215	7-8
	Frequency of Train Service	216-223	8-9
	Platforms at Church Gate	224	9
	Passenger Traffic and Train Requirements	225-243	9-11

Central Railway

Chapter	Particulars	Paragraph	Page
	Suburban Sections	244-250	11-12
	Platforms at Victoria Terminus	251-252	12
	Journey time of trains on various sections	253	12-13
	Composition of Suburban trains	254-259	13-14
	Frequency of Train Service—		
	Main Suburban Line	260-267	14-15
	Harbour Branch	268-271	15
	Passenger Traffic and Train Requirements—		
	Main Suburban Line	272-284	15-20
	Harbour Branch	285-291	20-23
	Kurla—Mankhurd Branch	292	24
III	MADRAS SUBURBAN RAILWAY SYSTEM	301-343	25-33
	Madras Terminals	301	25
	Broad-Gauge System	302	25
	Metre-Gauge System	303	25

Metre gauge

Chapter	Particulars	Paragraph	Page
	Composition of suburban trains	304-307	25-27
	Frequency of Train Service	308-309	27
	Passenger Traffic and Train Requirements	310-312	27-30
	Tambaram—Chingleput section	313-316	31

Broad-gauge

Chapter	Particulars	Paragraph	Page
	Suburban Sections	317-322	31
	Composition of suburban trains	323-328	31-32
	Frequency of Train Service	329	32
	Passenger Traffic and Train Requirements	330-343	32-33

Chapter	Particulars	Paragraph	Page
IV	CALCUTTA SUBURBAN RAILWAY SYSTEM	401-458	34-52
	Calcutta Terminals	401-402	34
	Suburban System South of Sealdah		
	Suburban sections	403-408	34-35
	Composition of suburban trains	409	35-37
	Frequency of Train Service	410	37
	Passenger Traffic and Train Requirements	411-416	37-39
	Suburban System North of Sealdah		
	Suburban Sections	417-419	39-40
	Composition of Suburban Trains	420	41
	Frequency of Train Service	421	41
	Passenger Traffic and Train Requirements	422-433	41-45
	Suburban System North of Howrah		
	Suburban Sections	434-438	45-46
	Composition of Suburban Trains	439	46-47
	Frequency of Train Service	440	47-48
	Passenger Traffic and Train Requirements	441-447	48-49
	South Eastern Railway Suburban System		
	Suburban Sections	448-450	49-50
	Composition of Suburban Trains	451	50-51
	Frequency of Train Service	452	51
	Passenger Traffic and Train Requirements	453-458	51-52
V	OVERCROWDING IN SUBURBAN TRAINS AND STAGGERING OF WORKING HOURS AND ESTABLISHMENTS AS A REMEDIAL MEASURE.	501-518	53-56
	Collaboration of the public in solving the problem of overcrowding	501	53
	The problem of Overcrowding	502-503	53
	Staggering of Working Hours	504-510	53-54
	Dispersal of Establishments	511	54-55
	Passenger Discipline and Co-operation	512-515	55
	Future of Suburban Traffic	516-518	55-56
	ICREASE IN TRAIN CARRYING CAPACITY AS A REMEDIAL MEASURE	601-632	57-56
	Computation of Carrying Capacity	601	57
	Comparative study of the carrying capacities of an eight coach train	602-605	57-58
	Creation of space for standing passengers	606-612	59-61
	Reduction in the number of classes of passengers	613	61
	Equitable distribution of accommodation between the Upper and the Lower classes	614-615	61-62
	Marking out Upper Class by painting outside with distinctive colour	616	62
	Reservation of seats, instead of compartments, for ladies	617-618	63
	Removal of partition between compartments and reduction of lavatory accommodation	619-620	63
	Replacement of existing brake vans on steam trains by shells for multi-purpose usage.	621-623	63-64
	Augmenting the loads of trains	624-629	64-65
	Introduction of stock specially equipped for suburban travel on the steam sections.	630-631	65-66
	Travel on foot-boards and other precarious positions	632	66

Chapter	Particulars	Paragraph	Page
VII	INCREASE IN NUMBER OF TRAINS AS A REMEDIAL MEASURE	701-744	67-81
	Steam operated and electrified sections compared	701	67
	Examination of electrified sections at Bombay	702	67
	Reduction in detention to stock at terminals	703-704	67-68
	Reduction of stopping time at intermediate stations . . .	705	68
	Relaxation of speed restrictions at stations and *en route* . . .	706-707	69
	Running of trains at the fastest practicable speed with a view to reducing the running time	708-709	69-70
	Concentration of EMU stock in the inner suburbs and making other arrangements for outer suburbs	710	70-71
	Running of slow and fast services with facilities for transhipment from one to the other	711-718	71-74
	Procurement of additional EMU stocks	719-720	74-75
	Supplementing EMU stock service with other types of service . .	721-727	75-77
	Electrified section on Southern Railway	728-737	77-78
	Steam Sections	738-744	78-81
VIII	OTHER GENERAL AND SPECIFIC REMEDIAL MEASURES	801-819	82-87
	Space-Time-Speed Studies	801-811	82-84
	Stoppage of the Deccan Queen at Kalyan	812	84
	Running of Bombay-Calcutta Mail outside peak hours . . .	813	84-85
	Hazardous entraining and discipline	814-815	85
	Ferry Service on the River Hooghly	816	85-86
	Overcrowding due to inadequacy of Workmen's trains at Madras .	817	86
	Variations in Carrying Capacities of Rakes working the same train .	818	86
	Detentions to suburban trains to give precedence to faster trains .	819	86-87
IX	CONCLUSION	901-912	88-90

APPENDICES

APPENDIX	I	Copy of Railway Board's letter No. 82-TG/55/4, dated the 27th January, 1956.	91
APPENDIX	II	Printed Questionnaire issued to the Public	92-93
APPENDIX	III	Copy of Press Notification issued in continuation of the Questionnaire . .	94
APPENDIX	VIII	Copy of Demi-official letter, dated 7-11-55 addressed to the General Managers	95
APPENDIX	IX	Extract from Chapter 14 (Yard and Terminals) of American Railroad Engineers' Association Proceedings, Volume II.	96
APPENDIX	X	Level Crossings	97-98

ANNEXURES

Maps and Line Diagrams

ANNEXURE 1	Map of Bombay Railway Suburban Systems.
ANNEXURE 3	Map of Madras Railway Suburban Systems.
ANNEXURE 4	Map of Calcutta Railway Suburban Systems.
ANNEXURE 5	Line diagram of the suburban sections south of Sealdah.
ANNEXURE 6	Line diagram of the suburban sections north of Sealdah.
ANNEXURE 7	Line diagram of the suburban sections emanating from Howrah (Eastern Railway).
ANNEXURE 8	Line diagram of the suburban sections of the South Eastern Railway.

CHAPTER I

INTRODUCTORY

Appointment of the Committee and Terms of Reference

101. The decision to appoint this Committee was indicated by the Minister for Transport and Railways in the Lok Sabha on the 22nd February, 1955, while introducing the Railway Budget for 1955-56. Its terms of reference were announced by the Government of India, Ministry of Railways (Railway Board), in their Press Note dated the 22nd September, 1955, followed by Resolution No. E55C01/73/3 dated the 10th November, 1955 reproduced hereunder:—

"Government of India
Ministry of Railways
(Railway Board)

New Delhi, the 10*th November,* 1955.

RESOLUTION

*No. E*55*C*01/73/3.—While introducing the Railway Budget for 1955-56, the Minister for Railways indicated that he had decided to set up a small Committee to investigate and suggest remedial measures in respect of the problem of excessive overcrowding during peak hours in suburban train services at Bombay, Calcutta and Madras. Accordingly the Government of India have appointed a Committee which consists of—

(1) Shri B. B. Varma, retired General Manager of Indian Railways. · *Chairman.*
(2) Shri A. C. Chatterjee, retired General Manager of Indian Railways. } *Members.*
(3) Shri K. M. Rau, retired Controller of Stores of Indian Railways. }

The terms of reference of the Committee are—

(i) to investigate into the problem of excessive overcrowding during peak hours in the suburban services at Bombay, Calcutta and Madras; and
(ii) to suggest remedial measures.

The Headquarters of the Committee will be Madras."

Scope of the Enquiry

102. At our first meeting we felt that a certain amount of ambiguity existed in our terms of reference and so it became necessary, during our interview with the Railway Board at Delhi, to seek further clarification. We were informed by the Board that our investigations and recommendations should be confined to the state of overcrowding as obtaining at present and to recommend immediate remedial measures. The Board, however, desired that, while submitting the report, we might indicate the future trend of this traffic, as far as possible, based on the experience of the past and the present. It was, however, accepted that the scope of our work excluded any radical change in the existing structure of the suburban systems.

103. The following extracts from the Seventeenth Report, dated 20-12-55, of the Estimates Committee of Parliament forwarded by the Railway Board on the 27th January, 1956, were received by us on 7-2-56, when we had already commenced writing our report:—

"The Committee recommend that the following points should also be examined in connection with the overcrowding in suburban trains:—

(i) Provision of standing accommodation only in some compartments of suburban trains by removing the benches.
(ii) Reducing the minimum headway between trains to about 3 minutes against 4 minutes at Church Gate and 5 minutes at Victoria Terminus by improved signalling arrangements as suggested by the Indian Railway Delegation to the Soviet Railways and other European Railways; and
(iii) Staggering the office hours at Calcutta, Bombay and Madras, in consultation with the State Governments and the local business offices, so that the peak period can be spread out".

This was replied to on 8-2-56 by us in a letter addressed to the Deputy Director, Traffic (General), Railway Board, intimating that items (i) and (iii) had already received full consideration from us, and in fact were covered by items 3(b) and 8 of our Questionnaire to the public issued as early as November, 1955, and that as regards item (ii) it was understood that the Railways at Bombay and Madras were in communication with the Railway Board, and some Railways had already put forward their proposals, and if we were to examine this aspect, we should require to have that correspondence and to collect further evidence. No reply has yet been received. Copies of the Railway Board's letter and the Committee's reply thereto are at *Appendix I.*

104. We should like to mention that there are certain factors which lead to serious overcrowding on suburban trains, such as large scale ticketless travelling, forging of season tickets and the absence of any restriction on the number of journeys performed by season ticket holders. This privilege of unlimited number of journeys, not available on buses, makes railway travel more attractive. We have, however, interpreted that enquiries into ticketless travelling and forging of season tickets are outside our terms of reference, as they are drawbacks associated with the operation of a large organisation and are amenable to a tighter control. We notice that sufficient attention has not been paid, in the past, to the unlimited number of journeys permitted on season tickets, no record being maintained of the number of journeys performed each day by season ticket holders. This aspect requires to be studied both in the context of railway revenue and the number of journeys which the railway has to cater for.

Procedure of the Committee and Tours of Inspection

105. The Committee met at Delhi on the 2nd November, 1955, and drew up a Questionnaire, which was extensively circulated to the Trade and Industrial concerns, Chambers of Commerce, State Governments, Passenger Associations, etc. The total numbers circulated at Bombay, Madras and Calcutta were 2087, 976 and 1829 respectively. A copy of the Questionnaire appears as *Appendix II.* We further issued a press notification, *see Appendix III*, requesting the public to express their views in the matter, giving at the same time the itinerary of the Committee to such bodies or individuals as indicated interest. We received 147 replies to our Questionnaire from Bombay, 70 from Madras and 53 from Calcutta, from the persons and institutions listed in *Appendix* IV*.

106. We visited Bombay, Madras and Calcutta, the first city on two different occassions. We travelled in suburban trains, during rush periods, on all the five Railways, in order to have personal experience of the conditions of travel. We also inspected the EMU stock workshops at Tambaram (Madras) and at Bombay Central and Kurla (Bombay), and studied the working of the important stations on the suburban systems, in order to acquire first hand knowledge of the operation of the electric services. *Appendix V** embodies a list of the Railway officers, who accompanied the Committee on such of their tours of inspection, as were arranged in conjunction with the Railways. We had discussions with the General Managers, Heads of Departments and various Executive Officers. *Appendix VI** is a list of the meetings, the Committee had with the Railways at Bombay, Madras and Calcutta. We also had meetings with representatives of Passenger Associations and individuals who volunteered or were competent togive evidence in the matter of suburban railway overcrowding. A list of these witnesses appears in *Appendix VII**.

Need for Reliable Statistical Data

107. The determination of the extent of overcrowding during peak hours presented an initial difficulty as to how this was to be assessed and to what statistics, maintained by the Railways, we were to refer to get an idea of the problem.

Railways generally rely on station booking figures to judge the extent of travel on a particular section or train, but this method is unsuitable for suburban sections, where the frequency of trains precludes ticket issue figures being maintained train by train, and even if this was done, the large proportion of season ticket and pass holders would vitiate results to an extent that would make the labour of keeping such figures not worthwhile.

108. An idea of the number of season ticket holders amongst the suburban travellers can be got from the Railway Board statistics that detail suburban travellers into two categories—

(i) Those that travel on season tickets, and
(ii) those that travel on ordinary tickets.

---

*Not Printed

The figures for these for the different Railways are as follows:—

Railways	Season Tickets	Single Journey Tickets	Ratio
(1)	(2)	(3)	(4)
1953-54	millions	millions	
Western Railway	93·2	53·3	1·75:1
Central Railway	88·2	46·8	1·88:1
Southern Railway—			
BG	4·4	4·4	1:1
MG	12·9	13·4	1:1·04
Eastern Railway	69·1	47·5	1·45·1

The ratio between the two classes has been derived by us and is given in column (4), and this indicates the predominance of the season ticket holders. This ratio is not a true index, as the basis of the compilation of the number of passengers of the two categories itself, is open to question, as the number of journeys performed by a season ticket holder is assumed in the compilation to be a return journey for 25 days in the month and none on the other days. We have no desire to comment on the propriety of this method of equation for purposes of charging fares or other statistical purposes, but there is no room for doubt that these figures give no basis for estimating the number of journeys performed by the travelling public. The basis might be near enough in areas, like Calcutta, where trains are few and far between, and season ticket holders can do no more than a round trip a day, if they have a full day's work in the city, but where trains are fast and frequent as on the electrified sections, the season ticket holder may do many more than a round trip even when he is putting in a whole day's work in the city. He may do a trip to market in the morning before attending office, go home for lunch, and do one or more trips in the evening for business or pleasure. The number of journeys he performs, therefore, is far more than the 25 return journeys per month, reckoned to be performed by a season ticket holder. Overcrowding on trains is affected by the numbers of journeys undertaken, and an estimation of the number of journeys per season ticket is an important index of the state of overcrowding to be expected, and the number of trains that are to be run at different times of the day. The above has made no mention of the scope of malpractices that exist in the system of season tickets whereby an unscrupulous holder passes on his ticket to another unscrupulous person, to impersonate him and undertake other journeys. Besides these, are the travellers without tickets and with forged season tickets. All this adds on to the strain on accommodation provided by the Railways for *bona fide* ticket holders. What applies to season tickets is equally applicable to pass holders, whose number at these centres is by no means insignificant. The fact of the existence of Railway headquarters offices, employing thousands of persons, cannot be ignored and the number of passes issued to employees and their children and the journeys performed by them have only to be computed to realize their enormous extent. The figures maintained by Railways take no account of them at all, and it is no wonder that estimates of journeys performed vary over wide limits.

109. Not being able to find a basis for ascertaining the numbers of journeys undertaken in any published or unpublished figures of the Railways, we requested the Railways, by a personal D. O. letter to the General Managers (*Appendix VIII*), at the very commencement of our enquiry to undertake a census of passengers getting in and out of the trains, so that we could have some basis for estimating the extent of overcrowding and the measures to counteract it. Some railways pleaded that the job was impracticable whilst others wanted us to accept that every season ticket holder performed a journey, during peak periods, and that this basis was good enough for our enquiries. We had to persist in our request for some reliable data, and it was only after considerable persuasion that Railways were induced to furnish us some figures. Two Railways had to repeat their census operations, as the data originally given was obviously incorrect and could not stand the rough and ready tests that we applied. This had to be rejected and to be replaced by fresh figures which were compiled as late as the end of February, 1956. Although we cannot vouch for the accuracy of the data eventually given to us, we have reason to believe that it represents the result of an honest endeavour made by persons unskilled in the art of compiling such data. It is good enough

for the purpose of our enquiry, but we feel that if railways trained some nucleus staff for the purpose, and built up an organisation which could be expanded when necessary, they would have a useful machinery that will enable them to assess the traffic that they carry, and to apply correctives that will minimize overcrowding and avoid the wasteful running of trains that lack patronage.

110. Not only do the Railways require to have census data of the sort collected for us but, in our opinion, they need to know the needs of the travelling public more accurately as the suburban travellers are, in a large majority of cases, regular travellers moving at fixed hours between fixed stations to get to and from their places of work. We have seen that season ticket holders are a considerable proportion of the travellers and, if to these are added the figures of pass holders, the number of fixed travellers will still further increase. Each one of these undertakes regular journeys and picks up the train that will most quickly take him to his place of work and bring him back home. An economical and satisfactory service can only be built, if the Railways knew what suited its constituents, which cannot be judged from the number or nature of the complaints received. To get a realistic picture, something more positive is required, such as the method of taking occasional polls from regular travellers. The data obtained from the polls could then be classified by using mechanical aids, and made the basis for the suburban train time-table. We think that the nucleus organisation for taking passenger census suggested earlier could undertake this work also with beneficial results.

111. The importance of having some such data was also stressed by the Sub-Committee of the Zonal Railway Users' Consultative Committee set up by the Central Railway on the 17th June, 1955, with the Chief Operating Superintendent of the Central Railway as the President with the Chief Commercial Superintendent, the Chief Electrical Engineer, the Chairman of the Bombay Port Trust and a representative of the Bombay Divisional Railway Users' Consultative Committee as Members and the Divisional Superintendent, Bombay, as its Member-Secretary. Their report made in January 1956, contained the following:—

> "In the existing circumstances of inadequacy of suburban stock, it is necessary that the running of trains and the stoppages must correspond strictly to the traffic requirements and the Committee consider that—
>
> (i) A Survey of passengers originating and terminating at various stations should be taken;
>
> (ii) An assessment of passengers travelling at various times of the day at stations should be made and this assessment should indicate the passengers travelling in the various directions.
>
> With this data on hand, it will be possible to regulate stoppages and to run faster trains at least in the reverse direction to peak movement so as to be able to fit in a few more trains in the direction of the peak movement. The Committee further consider that such a survey should be conducted every six months so that the Railway Administration has a complete picture of the movement of suburban traffic."

This supports the view we have held about the necessity of an organisation for taking occasional polls and periodical census and interpreting them to test the adequacy or otherwise of the planned services for suburban passengers.

Time-Space-Speed studies

112. Apart from the movement of passengers by train, their movement in and out of the train, on the platforms, on the overbridges with steps or ramps, and across the ticket checking barriers has to be studied carefully. Inadequate width of platforms and obstructions, like vendors' stalls, food trolleys and even benches on platforms, impede the free flow of passengers, create bottlenecks which prevent quick emptying of trains and their even filling up, cause detentions, affect punctuality and aggravate overcrowding. Considerable work on this aspect of passenger movement, immediately before boarding a train and directly after leaving it, has been done in the U. S. A. and classified data under the name "Time-Space-Speed" studies are made available, which aid the management in the design of structures and stock, and in the operation of the services. An extract, in this connection, from Chapter 14 of the American Railroad Engineers' Association Proceedings, Vol. II, is given in *Appendix IX*. We recommend that "Time-Space-Speed" studies on similar lines be made on railways in this country and the data published in order to improve operation and avoid waste of resources.

Plan of the Report

113. The suburban system in Bombay, Madras and Calcutta differ both in gauge and means of locomotion—some sections being electrified and others operated by steam. Their working conditions and the traffic carried are so dissimilar that we have to deal with them in separate chapters. No attempt has been made to describe the sections fully but such details as have an important bearing on the problem before us have been included.

114. In the chapter devoted to each locality, details of the traffic handled during the rush hours have been given and what needs to be done to reduce the overcrowding to reasonable limits, has been indicated under "Passenger Traffic and Train Requirements". How this is to be done is detailed in four chapters dealing with Staggering, Increase in the Carrying Capacity of trains, Increase in the Number of trains and other General and Specific Recommendation to each of which a separate chapter is devoted.

115. The basic data *viz.* the train service and the passenger traffic have been tabulated in two charts—

(i) Train Charts.
(ii) Census Charts.

which have facilitated analysis and investigation. What these charts display is described below and the charts for the various sections appear in the Annexures.

Train Charts

116. Two Train Charts have been drawn up for each section, one for trains approaching the city terminus, and the other for those leaving it. Each chart has a column for each hour of the day, so marked at the top, while down the column are figures which indicate the minutes after that hour when a train arrives at the station, or departs from it. The timings so arranged give at a glance the way the trains are spread over a day, hour by hour. The figures for minutes are written in the distinguishing colour of the originating or destination station of the train.

For example, if we refer to *Annexure* 22* relating to trains leaving Sealdah (South) for the South suburban section *via* Ballygunge, Eastern Railway, the figure '8' in column headed 9, means that at 9·8 hours a train leaves Sealdah (South) for Budge Budge, while '20' under 17 means that a train leaves Sealdah (South) for Canning at 17·20 hours.

Other characteristics, such as whether the EMU stock trains are single unit or double unit are shown by underlining the figures for minutes in one case and not the other. Through trains running on the same track as suburban trains and not catering for suburban traffic are distinguished by the minutes being shown in Roman figures. These and other conventions are explained on the charts themselves.

At the foot of the columns on each chart appear the total number of trains for each hour: their distribution amongst stations appear on the right.

A column showing the progressive totals representing the number of trains serving each station is provided, run through trains being excluded.

Census Charts

117. Census Charts for each section of a system have been prepared separately for either direction *i.e.* towards the city and away from it. Extracts from them for the rush periods of a day are included in the Annexures. On each chart appear the name of the Railway, the suburban sections and the originating or destination station, the date of the census and the direction of movement—to or from the city terminus. The census figures for trains have been arranged in three columns, which give particulars about them as they pass each of the stations, the names of which are listed in the order in which trains approach them. In the original charts prepared in manuscript, where the number of persons was in excess of the carrying capacity of the train, the figures were written in red, and where the number was less than half the carrying capacity, the figures were in blue. This differentiation serves to show at a glance, where overcrowding existed along the route, and where the train ran light. For facility in typing copies, the convention has had to be altered to underlining of figures for overcrowding, and enclosing in brackets the figures of less than half the carrying capacity. Further, at the head of each group of the three columns pertaining to a train are shown the number of the train and its carrying capacity. The charts also show the timings of each train at its starting station or destination station and the city terminus. The timings at the intermediate train starting or terminating stations are also shown. The census charts are reproductions of the figures furnished by the Railways. Minor inaccuracies, though observed, have not been rectified, as they do not materially affect our analysis.

---

*Not Printed.

CHAPTER II

BOMBAY SUBURBAN RAILWAY SYSTEM

Bombay Terminals

201. Bombay is spread over two islands, one behind the other jutting out into the Arabian Sea. The Central and Western Railways, as will be seen from the map, *Annexure* 1, run across these islands, first converging towards Dadar, and then slightly diverging away to their respective suburban termini at Victoria Terminus (Bombay V. T.) and Churchgate about 3/4 miles apart. Victoria Terminus, besides being in the proximity of the Fort area, is also very close to the Dock area and is, therefore, popular with visitors to these areas, whilst Churchgate lies between the sea face and the business centre round Flora Fountain, and is directly connected to the most populous residential areas of Greater Bombay.

202. A glance at the map of Greater Bombay*, *Annexure* 2 clearly brings out that whereas the Western Railway runs through the densely populated residential area extending up to Goregaon, the Central Railway has industrial establishments along its route situated all the way up to Thana, and that explains why the Western Railway carries the larger share of the suburban traffic. Both the Railways are broad-gauge and are completely electrified in this area except that the Western Railway's through Passenger and Goods services are still worked with steam engines up to Bombay Central, the through line terminus.

WESTERN RAILWAY

Suburban Sections

203. The Western Railway's two suburban tracks run 2¾ miles further from Bombay Central across a heavily congested residential area before terminating at Churchgate. As a consequence the Central-Churchgate section is seriously handicapped during rush periods: it has no through line tracks to fall back upon for running additional suburban trains during the rush hours.

204. The suburban area extends right up to Virar, 37¼ miles away from Churchgate, but separate Up and Down Suburban lines are provided from Churchgate to Borivli (mile 21¼) only, beyond which suburban trains share the through lines along with the main line Goods and Passenger traffic for a distance of 16 miles, between Borivli and Virar. Although the entire section up to Virar is electrified, the Western Railway have no electric locomotives, and work all their main line goods and passenger traffic with steam engines, whilst suburban traffic is all handled in EMU stock. Even on the section Bombay Central to Borivli where separate suburban tracks are provided, suburban trains are often diverted to run on the through lines when paths are available. As a rule, through line passenger and goods traffic is so timed as to avoid the suburban rush and the through lines are, therefore, available for suburban traffic during rush periods.

205. The Central Railway's Harbour Branch from Victoria Terminus joins on to the through lines of the Western Railway at Mahim so that suburban trains running on the Harbour Branch for Bandra and Andheri have to be dealt with on the through lines of the Western Railway along with their own traffic. There are no fly overs at Mahim and all Central Railway trains from Victoria Terminus proceeding to Bandra and Andheri cross the Up through line of the Western Railway to join the Down through line. Admission of Central Railway's Harbour Branch trains into Mahim, therefore, depends on both Up and Down through lines being clear. The Central Railway works 104 suburban trains in and out of Bandra every day on a section where the Western Railway plies 286 suburban trains besides through Passenger and Goods traffic. Many of these trains run during the rush hours, which are common to both.

206. There are 14 stations on the Section, Churchgate to Andheri, spaced between ¾ to 1½ miles; between Andheri and Borivli there are 4 stations 1 to 2 miles apart while between Borivli and Virar, there are only 5 stations, the maximum distance between a pair of them being as much as 5¼ miles. Proposals for reducing the length of block sections are under the consideration of the Railway.

207. There is continuous track circuiting between Churchgate and Andheri, and trains work on the automatic block system with 3 aspect colour light signalling. Beyond Andheri up to Virar trains work under the Absolute Block System, stations being equipped with Siemens three position Double line Block instruments and two aspect colour light signals.

---

*Not Printed

208. The maximum permissible speed for the track is generally 60 m. p. h. but the following severe speed restrictions affect optimum use of stock:

(i) 40 mph between Churchgate and Grant Road

(ii) 45 mph between Grant Road and Elphinstone Road

(iii) Various speed restrictions at Bandra, Mahim etc., detailed in Appendix A to the Working Time Table.

209. Roads cross the railway lines by means of level crossings at Matunga Road, Mahim and Santacruz, Vileparle and Andheri, for which the provision of overbridges in replacement is under the consideration of the Railway.

210. The shed for repairs to the EMU stock is located close to Bombay Central and mechanical repairs to the EMU stock are carried out in Parel Workshops.

Composition of Suburban Trains

211. All Suburban trains are worked with the Electric Multiple Unit (EMU) stock, each unit of which consists of four coaches. All rakes on this railway are composed of two units *i.e.*, eight coaches, no trains being worked with single units, although the units are capable of being worked singly. The stock is of two type designs, differing from each other, both in performance and carrying capacity. The older stock has one motor coach and three trailers forming a unit while the 1951 stock has two motor coaches and two trailers making up a unit. The principal characteristics of the two are given below:

	Old	*New*
H. P. of motors	1100	1400
Maximum speed M. P. H.	48	65
Acceleration M. P. H./Sec.	·9	1·1
Seating capacity	942	834
Standing capacity	554	734
Total	1496	1568

212. Although the speeds at which the two types of stock can work differ, all trains are booked at an uniform time table speed of 45 m. p. h.

213. Two classes of travel—the first and the third—are provided with separate compartments reserved for ladies in each class. Toilet facilities are not provided on the trains, but they are on platforms in convenient positions. There is a luggage compartment in each unit which means two luggage compartments per train.

214. The Railway's stock comprises 40 old units and 12 new units, making a total to 52 units or, 26 rakes of two units each. Four rakes remain in shops for periodic overhaul and repairs, leaving 22 rakes for traffic use. During the middle of the day from 11-30 to 17-30 hours, when traffic requirement is not heavy, six rakes are sent by turn to car shed near Bombay Central every day for washing and weekly inspections. No standby rakes are kept in reserve for emergency purposes, and trains have to be cancelled when rakes develop any defects.

Journey time of trains on various sections

215. The following table gives the normal time taken by trains to cover the various sections. This information has been extracted from the time table:—

Miles	Section	No. of intermediate Stops	Time taken by trains
2¼	Churchgate—Grant Road	2	7′ to 8′
6½	Churchgate—Dadar	7	21′
6½	Churchgate—Dadar	4	15′ to 18′
9¼	Churchgate—Bandra.	10	31′ to 36′
		4	23′ to 27′
		3	21′ to 23′
13¾	Churchgate-Andheri	14	45′ to 46′
		8	37′ to 43′
		6	32′
		5	32′ to 35′

Miles	Section	No. of intermediate Stops	Time taken by trains
21½	Churchgate—Borivli	19	63′ to 72′
		13	56′ to 64′
		5	47′ to 49′
37½	Churchgate—Virar	25	98′ to 115′
		18	91′ to 96′
		15	85′ to 90′

Every transfer of train from suburban to through line means loss of about a minute in observing the 10 mile speed restriction over turn-outs. Some of the fast trains make this change several times sometimes to accommodate the Central Railway trains between Bandra and Mahim. The time taken by Main line steam trains running between Bombay Central and Virar and making 3 intermediate stops is 86′ while non-stopping fast trains cover it in 54′.

Frequency of Train Service

Trains to Churchgate

216. The train chart for trains arriving at Churchgate, *Annexure* 9* indicates that 152 trains run into Churchgate every day from stations whose distribution is clearly brought out in the table.

217. The period of maximum rush of passengers to town is the morning, when 8 trains per hour work into Churchgate increasing to 11 trains between 9 and 10, 13 trains between 10 and 11 and then dropping to 9 trains bewteen 11 and 12.

218. Trains arrive Churchgate in quick succession, the minimum interval between trains being—

1′ in one case,
3′ in five cases,
4′ in six cases,
5′ in four cases.

there being longer intervals in the other cases. Of the 24 trains arriving at Churchgate between 9 and 11 hours.—

4 originate from Virar,
8 originate from Borivli,
8 originate from Andheri,
3 originate from Bandra, and
1 originates from Dadar.

which puts the frequency of service available for passengers from these stations at 4 for Virar, 12 for Borivli, 20 for Andheri, 23 for Bandra and 24 for Dadar during these hours.

219. Out of these 24 trains, 12 are skipping trains and 11 of them run over the through lines for a part of their journey. The 12 skipping trains between them run non-stop through 108 stations only while they stop at 121 intermediate stations besides the terminals. The other 12 stopping trains stop at every station and these stops amount to 186.

Trains starting from Churchgate

220. The train chart for trains starting from Churchgate, *Annexure* 10*, indicates that out of a total 144 Down trains that run out from Churchgate every day—

3 terminate at Dadar,
15 ,, ,, Bandra,
49 ,, ,, Andheri,
54 ,, ,, Borivli, and
23 ,, ,, Virar.

---

*Not Printed.

221. From the hourly distribution figures at the bottom of the chart, it will be seen that—

7 trains leave between 15 & 17 hours.
11 „ „ „ 17 & 18 hours.
13 „ „ „ 18 & 19 hours.
8 „ „ „ 19 & 20 hours.
7 „ „ „ between each of the subsequent hours.

222. Reference here is not made to the trains during the morning hours, as during that time the rush of passengers is in the reverse direction and the large number of trains leaving then is really return trains sent back after carrying passengers to their places of work in the town. There are 3 trains at 5′ interval between 17—17-10 followed by a train at 17-20 but the period of maximum rush of trains starts from 17-30 when 3 trains leave at 5 minute intervals, followed by 10 trains at 4′ intervals and 8 trains at 5′ intervals, extending up to 19 o' clock.

223. Of the 24 trains that run from 17 to 19 hours, 11 only are skipping trains and 9 of them run over the through lines for a part of their journey. The 11 skipping trains between them run non-stop through 79 stations only, while they stop at 121 intermediate stations besides the terminals. The other 13 trains stop at every station on their run and these stops aggregate to 186.

Platform at Churchgate

224. There are only 3 lines with platform faces for the reception of 152 trains and departure of 144 trains, averaging to about 50 trains per platform line per day. During an hour of rush, 13 trains arrive and 11 depart making a total of 24 or 8 trains per platform, on an average, during the hour. During an hour of evening rush, 13 trains depart and 12 trains arrive making a total of 25 or over 8 trains per platform, on an average, during the hour.

Passenger Traffic and Train Requirements

Morning Rush

225. The rush of passengers is towards the city in the morning and so extracts from the census figures taken for trains reaching Churchgate between 7·44 and 11·21 hours on 27-2-56 (Monday) are given in *Annexure* 29*.

226. It will be seen that on the Section *Virar to Borivli*, train intervals vary from 15 mts. to an hour, yet trains do not fill up on this section except in the case of two trains which do so at Bhayandar and Dahisar. One of these reaches Churchgate at 8·23 and the other at 10·18.

227. On the section *Borivli to Andheri*, of the 9 trains reaching Churchgate up to 9 o' clock, only one train gets overcrowded to almost double its carrying capacity and its popularity seems to be the greater, because it is a train that runs fast, skipping 10 stations on the way to Churchgate; others fill up fairly well, though not up to the full capacity.

228. Of the six trains that run over this section and reach Churchgate between 9 and 10 hours, the first, SW 62, attracts about 400 passengers at each of the contiguous stations Goregaon and Jogeshwari, and gets overcrowded at these stations. The next train, SW 66, runs half full on this section, perhaps because city-bound passengers catch the later train, SW 68, which runs fast and reaches Churchgate earlier than it, even though SW 68 is heavily overcrowded on this section. The fourth train and the sixth train fill up to capacity on the section, while the 5th runs through fairly full, but running through without picking up passengers at the intermediate stations.

229. Of the 7 trains that reach Churchgate after 10 hours every one fills up to capacity on this section, the maximum over-crowding being noticeable on the fast train, SW 92, reported to carry 3,644 passengers, which is more than double the carrying capacity.

230. On the Section *Andheri to Churchgate*, all trains running into Churchgate after 7·59 and up to 11·12 are running full and excessively crowded, almost right along, the only exceptions being:

(i) SW 52 which originates from Bandra at 7·57 when a fast train No. SW 50 leaves that station and reaches Churchgate 7 mts. later than the fast train. It caters either for the stations where the fast train does not stop or for those passengers that are unable to find their way into the fast train carrying about twice the number of passengers that it is marked to carry.

---

*Not Printed.

3—1 D. T. (Rly. Bd.) 56

(ii) SW 90, which originates from Andheri at the same time as a fast train passes that station, and reaches Churchgate 14 mts. later. It gets overcrowded between Dadar and Bombay Central and caters for traffic which the faster trains do not pick up.

(iii) SW 96 and SW 98 leave Bandra and Andheri respectively and do not carry more than about 1100 passengers at any point on their run for reason similar to those given in the other cases.

(iv) SW 106 leaves Dadar at 10·37 and reaches Churchgate at 10·54 and really marks the end of the office rush. The maximum number on this train is 933.

(v) SW 108 leaves Andheri at 10·20 and reaches Churchgate at 11·9 after the office rush hours. The maximum number on this train is about 1200 at Matunga.

231. Looking at the charts from another angle, it is seen that Churchgate receives trains up to 9 o'clock at the rate of 8 trains per hour or at 7½ minute average interval. If we total the largest number of passengers noticed at any point on each of these trains and divide it by the number of trains, we find that the average comes to about 2300 per train and this could be reduced to 1500 per train if the number of trains was increased to 12 per hour corresponding to a 5 minute service.

232. Between 9 and 10 hrs. there are 11 trains and the average of the largest number on each train comes to 2238, requiring 16 trains per hour to limit this figure to 1500. This will require a 3½ minute service.

233. Between 10 and 10·30 hrs. there are 7 trains at an average interval of 4 mts. and the average of the largest number on each train comes to 2,574 requiring 12 trains during this half hour to limit this figure to 1500. This will require a 2½ minute service.

234. From the above figure it will be seen that what is required in the morning would be:—

a 5 minute service up to 9 hours,
a 4 minute service between 9 and 9·30 hours,
a 3 minute service between 9·30 and 10·30 hours, and
a 5 minute service after 10·30 hours.

Evening Rush

235. In the evening, the rush of passengers is away from the city, and so extracts from census figures for trains leaving Churchgate from 16·00 to 20·45 hours are given in *Annexure* 30*. During the period 16 to 17 hours, none of the trains get overcrowded up to Grant Road, but three trains leaving at 16·0, 16·20 and 16·38 do get overcrowded on the sections beyond. Train No. 185 leaving at 16·38 is very heavily overcrowded beyond Bandra, as the interval between trains on this portion of the run is very great. After 17 hours the pressure on the trains increases, and all trains run excessively overcrowded up to 18·16 except for:

(i) No. 197 leaving at 17·10 for Bandra. The maximum number on this train is 989 and its under-occupation appears to be due to a fast train No. 199 leaving Churchgate 8 mts. later and reaching Bandra at the same time. This later train besides having a later and more convenient departure time for office leaving staff has the merit of skipping some stations and is naturally more attractive.

(ii) No. 207 leaving at 17·40 for Dadar. Maximum number of passengers on this is 869.

(iii) No. 219 leaving at 18·04 for Dadar. Maximum number on this 946.

236. After 18·20 hours trains Nos. 227, 229 and 231 leave at 5 minute intervals. These trains fill almost to capacity but do not get overcrowded, but those following them after 18·35 do get excessively overcrowded despite the fact that a 5 minute service is maintained up to 19 hours. The fast running trains are the more popular and the number of passengers in them far exceeds that on the stopping trains. SW 241 leaving at 18·55 starts with 1891 passengers, and is shown as having about 3000 passengers or twice its marked capacity all the way between Grant Road and Andheri. The only train that does not fill to capacity is No. 239. leaving at 18·50 for Bandra. The Maximum number on this is 1186.

237. Between 19·00 and 20·35 hours, there are 13 trains at an average interval of 8 minutes, and all of them get overcrowded to varying degrees, but the faster trains do get the larger share. The only train that does not get overcrowded is SW 265 at 20·25, the maximum number on this being 1026. Trains after this hour do not get excessively overcrowded, and their frequency decreases as the night advances.

---

*Not Printed.

238. With regard to areas of overcrowding, Goregaon usually marks the limit, up to which trains run overcrowded, the only exceptions being three trains which are overcrowded, even beyond. In judging the extent of overcrowding it has to be kept in mind that the frequency of service reduces materially after Andheri, which is responsible for the heavy concentrations on certain trains.

239. Looking at the charts from the other angle, it is seen that between 16 and 17 hours, Churchgate despatched 7 trains *i.e.*, at an interval of 8½ minutes on the average. The total of the largest number of passengers noticed at any point on the run divided by the number of trains gives the average figure of 1615 per train, and this could be reduced to 1500 per train, if an additional train were introduced *i.e.*, average interval was decreased from 8½ to 7½ minutes. Passengers will, of course, be more evenly distributed, only if stops of trains are regulated to control it.

240. From 17 to 19 hours, trains are running at the average interval of 5 minutes, except for the period between 17·40 and 18·20 when 10 trains follow at 4 minute interval. The average of the largest numbers on these 22 trains comes to 2220. This figure to be brought down to 1500 will require about 33 trains during the 2 hours corresponding to a 3½ minute service.

241. Between 19 to 20 hours there are 8 trains *i.e.*, a 7½ minute service. The average of the largest number on these comes to 2,189 which will require 12 trains or a 5 minute service to bring it down to 1500.

242. Between 20 and 20·35 there are 5 trains *i.e.*, a 7 minute service. The average of the largest number on these comes to 1880, which will require an additional train or a 6 minute service to bring it down to 1500.

243. From the above it will be seen that what is required in the evening would be:

from 16 to 17 hours a 7½ minute service,

from 17 to 19 hours a 4 minute service,

from 19 to 20 hours a 5 minute service, and

from 20 to 20·30 hours a 6 minute service.

NOTE.—We have worked on the basis of averages of the maximum number of passengers on the train at any point of its run as a guide to assess the number of trains required, and have relied on the supposition that census charts and passenger movement will be studied with a view to so regulating the stops that the maximum effort will be put out to obtain as even a distribution as is practicable. We realize that the formula adopted by us has its limitations, and is not mathematically accurate, but in the absence of a better method, we have used it as a rough and ready guide.

CENTRAL RAILWAY

Suburban Sections

244. *Main Suburban Section.*—The suburban section of the Central Railway along the Main line extends from Victoria Terminus to Kalyan, a distance of 33 miles, in which a set of double lines is provided for the exclusive use of the suburban traffic. These suburban lines lie along the through Up and Down lines provided for the use of through passenger and Goods traffic. When not required for that traffic the through lines are also utilised for suburban traffic. In fact time-tables are so drawn as to keep the through lines free of through trains during the rush hours, the only exceptions being the Deccan Queen, the Janata Express and the Calcutta Mail via Nagpur. There are 22 stations on this section. They are spaced about a mile apart between Victoria Terminus and Matunga and up to 3 miles apart thereafter, the only exception being section Diva to Dombivli which is 3·29 miles.

245. Although for statistical purposes of suburban traffic, the Railway Board regards Kalyan as the limit, the Railway regards the two sections Kalyan-Karjat a section of 29 miles on the Poona Main line and Kalyan-Kasara a section of 42 miles along the main line to Bhusaval as falling within the area of suburban traffic, and runs its EMU stock on them. There are no separate suburban lines on these sections, nor are the stations close to each other, there being 6 intermediate stations in the former section of 29 miles and 7 stations on the latter section of 42 miles; the maximum distance between stations is 8·41 miles. Refugee settlements of Vithalwadi and Ambernath are located on the Karjat section quite close to Kalyan and are served by stations of those names. Two stations further up this line is Neral, the junction with the narrow gauge line going up to Matheran.

246. *Harbour Branch.*—Between Victoria Terminus and Kurla a separate set of double lines follows a distinct alignment, serving the Harbour area and this section is called the Harbour Branch. It is 10 miles long and follows the same alignment as the main suburban line for two stations Masjid and Sandhurst Road after which the track is elevated to cross the main suburban and through lines to serve a distinct area, ultimately meeting at Kurla. Two stations short of Kurla the line bifurcates at Ravli junction, one leg meeting the Western Railway Main line at Mahim. Suburban trains run on this branch from Victoria Terminus to Bandra and Andheri on the Western Railway and to Kurla and Thana stations on the Main line and on to Mankhurd Branch, which is a $3\frac{3}{4}$ mile long branch line taking off from Kurla. This branch line is being doubled and has two intermediate stations, the more important being Chembur $1\frac{1}{4}$ miles from Kurla.

247. On the Main suburban and through lines from Bombay V. T. to Byculla, automatic colour light signalling is provided. It is also provided from Byculla to Kurla 'A' cabin on the main suburban line and Kurla Cabin 'A' to Dadar on the through line. On the Harbour branch service, Bombay-Bandra and Bombay-Kurla have automatic colour light signals.

248. On the other sections, the Absolute Block system is in force with block instruments and two aspect semaphore signals, except that, on the Kurla-Chembur section, two aspect colour light signals are provided.

249. The maximum permissible speed for electrical stock on the tracks is generally 65 m. p. h. between Bombay and Karjat and 55 m. p. h. between Kalayan and Kasara. There is a severe speed restriction just outside Victoria Terminus which causes a loss of 3 minutes to each train. Similarly a 6 mile speed restriction on Mankhurd branch just outside Kurla means a loss of 4 minutes for each train.

250. The shed for the repairs to the electrical stock is located at Kurla while mechanical repairs are done at Parel.

Platforms at Victoria Terminus

251. There are 8 platforms in the suburban station at Victoria Terminus, of which one is generally left out for stabling and dealing with non-suburban traffic, whilst two platforms receive 108 and despatch 108 Harbour Branch trains, 5 platforms receive 133 and despatch 135 Main suburban line trains.

252. It will be seen that platforms 1 and 2 during the rush hours receive and despatch $10+9=19$ trains in one hour *i.e.*, 9·5 trains per platform per hour, whilst 5 Main suburban line platforms between them receive 14 and despatch 9 trains $=23$ trains which gives an average of $4\frac{3}{5}$ trains against $9\frac{1}{2}$ per platform for Harbour Branch platforms. It will be recalled that Churchgate receives 13 and despatches 11 making a total of 24 trains for 3 platforms in an hour which gives an average of 8 trains per platform.

Journey time of Trains on Various Sections

253. The following table gives the normal time taken by trains to cover the various sections.

Miles	Section	Number of intermediate stops	Time taken by trains (in minutes)
33	Victoria Terminus to Kalyan	20	93
	„ „	8	72
	„ „	5	71
	„ „	4	68
	„ „	3	62
21	Victoria Terminus to Thana	14	59 to 61
	„ „	8	49 to 54
	„ „	2	39
21	Victoria Terminus to Thana by Harbour Branch	13	58 to 61

Miles	Section	Number of intermediate stops	Time taken by trains (in minutes)
10	Victoria Terminus to Kurla	9	32
	,, ,,	5	29
	,, ,,	4	28
	,, ,,	3	25
	,, ,,	1	22
6	Victoria Terminus to Dadar	6	21
	,, ,,	2	16 to 18
	,, ,,	1	14
	,, ,,	..	13
10	Victoria Terminus to Kurla by Harbour Branch	8	31
9	Victoria Terminus to Bandra	9	32
14	Victoria Terminus to Andheri	12	46
3½	Kurla-Mankhurd	2	11
62	Victoria Terminus-Karjat	26	115
75	Victoria Terminus-Kasara	27	206

Composition of Suburban Trains

254. With the exception of two each way, which are worked with Main line stock and electrical engines, all suburban trains are worked with Electrical Multiple Unit stock, each unit of which consists of 4 coaches. On the Main suburban section rakes are made up of two units *i. e.* 8 coaches but on the Harbour Branch both single unit and double unit trains are employed, the single unit having 4 coaches, and the double unit 8. The stock is of the following four kinds, each of which differs from the other in several respects.

(i) Old 12 ft. steel stock	13 units.
(ii) Old 10 ft. steel stock	20 ,,
(iii) Old 10 ft. wooden stock	18 ,,
(iv) New (1951) 12 ft. steel stock	16 ,,

255. The total holding of the Railway, therefore, comes to 67 units of which 16 are new. Out of this stock 11 units are not available for traffic use as they are required for periodical overhauls, repairs and maintenance, leaving 56 units for traffic use during their peak period. Outside the peak period some of these units are withdrawn for washing and daily attention.

256. The 56 units available for traffic use are divided into two links, one for the main line and the other for the Harbour Branch. 40 units make up 20 rakes of double units, and these are employed on the Main suburban line section, while 16 units run either as single or double units on the Harbour Branch. Some of the trains running beyond Kalyan get divided into two—one unit going to Karjat, and the other to Kasara. On their return journey they again join up to run as one train between Kalyan and Victoria Terminus. Any detention to one of these two units causes unpunctual running of the train for the major part of its journey.

The design of the different stock, their seating capacity and their performance characteristics vary with each type as given below:—

	Old	*New.*
H. P. of motors	1100	1400
Maximum speed m. p. h.	48	65
Acceleration m. p. h./sec.	·9	1.1
Seating Capacity	*670	.
	†858	830
Standing Capacity	*594	.
	†590	714
	*1264	1544
	†1448	

*Old 10 ft. wooden stock.
†Old 12 ft. steel stock.

257. Although the speeds at which the two types of stock can work differ, all trains are booked at an uniform time table speed of 45 m. p. h.

258. Two classes of travel—the first and the third—are provided with separate compartments reserved for ladies in each class. Toilet facilities are not provided on the trains, but platforms have them in convenient positions. There is a luggage compartment in each unit, making two luggage compartments per train. 12 ft. stock is not allowed to go beyond Kalyan owing to the existence of certain infringements, which are expected to be removed very shortly.

259. Two trains, each way, are run with ordinary stock hauled by electric locomotives and one of them, AK 20, is run during the morning rush hours and it arrives at Bombay V. T. at 10·20 hours. One train stops at 3 intermediate stations from Victoria Terminus to Kalyan and does the trip in one hour, while the other train makes 4 stops, and does the run in 82 minutes. In the reverse direction, one train stops at 4 intermediate stations between Kalyan and Victoria Terminus and does the trip in 73 minutes, while the other makes 5 stops and does the run in 70 minutes.

Frequency of Train Service

Main Suburban Line

260. The train chart for trains arriving at Victoria Terminus *Annexure* 11* indicates that 133 trains run into Victoria Terminus per day from stations indicated in the table at the foot of the chart. During the morning rush period 14 trains arrive between 9 and 10 hours, against only 5 trains arriving in the preceding hour and 8 in the succeeding hour. Trains arrive at 3' intervals, except in two cases. In one case, two trains arrive simultaneously and in another at 2 minutes interval. The trains in these cases use both the suburban and the through line to the exclusion of through traffic.

261. Of these 14 trains.
1 train arrives from Kasara
1 ,, ,, ,, Karjat
2 trains arrive ,, Ambernath
3 ,, ,, ,, Kalyan
3 ,, ,, ,, Thana
3 ,, ,, ,, Kurla and
1 train arrives from Matunga.

which puts the frequency of service for passengers from Kalyan at 7; from Thana at 10, and from Kurla 13, during this one hour.

262. Out of these 14 trains, 8 are skipping and between them they skip 87 stations, while they stop at 67 intermediate stations besides the terminus. The other 6 stopping trains stop at every station, the stops aggregating to 62.

263. Trains to Matunga and Kurla stop at every station, one out of three Thana trains is a skipping train while all the Kalyan trains are skipping.

264. The train chart for trains starting from Victoria Terminus, *Annexure* 12*, indicates that out of 135 trains leaving Victoria Terminus every day 49 terminate at Kurla, 3 terminate at Ghatkopar, 33 terminate at Thana and 46 terminate at Kalyan and beyond.

265. During the evening rush period 10 trains leave between 17 and 18 hours, 9 between 18 and 19 hours and 6 trains only between the hour preceding and following this period. The time interval between trains is 5 minutes generally, but there are gaps and greater intervals here and there.

266. Of these, 19 trains during the two hours,

1 go(es) to Kasara
1 ,, ,, Karjat
2 ,, ,, Ambernath
1 ,, ,, Vithalwadi
2 ,, ,, Kalyan
5 ,, ,, Thana
6 ,, ,, Kurla
1 ,, ,, Matunga.

---

*Not Printed.

Thus, Kurla is served by 18 trains.
Thana ,, ,, 12 trains
Kalyan ,, ,, 7 trains during these two hours.

267. Out of these 19 trains, 8 are skipping trains, one to Thana, and 7 to Kalyan and beyond, and between them skip 94 stations and halt at 64 intermediate stations, besides the terminus. The other 11 trains stop at every station.

Harbour Branch

268. The train chart for trains arriving at Victoria Terminus, *Annexure* 13*, indicates that 108 trains run daily into from Victoria Terminus.

4 from Andheri and
48 from Bandra } Total 52 from Bandra and *via*

32 from Thana
15 from Mankhurd
9 from Kurla } Total 56 from Kurla and *via*

84 out of these run with single units, and 24 only with double units.

269. During the morning rush, 10 trains (of which 3 are double units) are received between 9 and 10 hours mostly at 6 minutes intervals, while in the preceding and following hours only 5 and 7 trains respectively are received. These ten trains classified according to starting stations are as follows:—

1 from Andheri
3 ,, Bandra } Total 4, *via* Bandra

3 ,, Thana
2 ,, Mankhurd
1 ,, Kurla } Total 6, *via* Kurla.

Most of them stop at every station on the Harbour Branch.

270. In the reverse direction, the train chart of trains leaving Victoria Terminus, *Annexure* 14*, indicates that out of 108 trains run out daily from Victoria Terminus.

4 leave for Andheri
48 ,, ,, Bandra } Total 52 *via* Bandra.

31 ,, ,, Thana
11 ,, ,, Mankhurd
14 ,, ,, Kurla } Total 56 *via* Kurla

Of these, 84 run with single units and 24 with double units.

271. The hourly distribution does not show a marked difference in the number of trains sent out per hour. The highest is 9 between 9 and 10 hours in the morning, but they are the trains returning from V. T. after the morning trip carrying the city bound rush whilst trains between 17 and 18 hours are 7, and between 18 and 19 hours 8, which is only slightly more than during other hours of the day. All trains stop, with a few exceptions, at every station on the Harbour Branch. During the evening hours 17 to 19, five trains that are extended to Thana supplement the main line service on the section Kurla—Thana.

Passenger Traffic and Train Requirements

MAIN SUBURBAN LINE

Morning Rush

272. In the morning, the flow of traffic is towards the city area. The census figures of the passenger traffic taken on a working day (Friday, the 2nd December, 1955), in respect of the trains arriving at Bombay V. T. between 7-47 hours and 11-55 hours are embodied in the chart in *Annexure* 31*. The figures do not show the Kasara and Karjat sections; neither is traffic on them excessive, nor the train service frequent enough to justify a separate analysis. Any overcrowding on one or the other of the trains can be rectified by local measures. The census is, therefore, confined to the Kalyan-Victoria Terminus section. All the trains running on this section are double units, their carrying capacities varying from 1246 to 1464, in accordance with the type of units.

---

* Not Printed.

KALYAN–THANA SECTION

273. It will be observed that—

(a) of the five trains running on this section and reaching Victoria Terminus upto 9-30 hours, there is no overcrowding on any one of them despite the fact that train intervals are as long as 25 minutes. In fact, two of them are less than half full for part of the journey, while the third *i. e.*, AK. 10 leaving Ambernath at 7-50 and Kalyan at 8-3 has a maximum of 253 passengers during this part of the journey.

(b) of the 6 trains running on this section and reaching Victoria Terminus between 9-30 and 10-40 hours, two trains Nos. NK. 8 and K. 26 are not overcrowded. It looks as if the former is not so popular with Kalyan Passengers, as it comes from Kasara, while the previous train originates from Kalyan, only 10 minutes earlier, and takes away 989 passengers from there, against 30 on train No. NK. 8. The latter train K. 26 reaches Bombay too late for Office, and is, therefore, atractive to persons travelling to Dadar-Byculla area. Train No. K. 18, carries a maximum of 1311 passengers on this section and figures amongst the overcrowded trains, only because the rake used is of the old type with carrying capacity as low as 1246 instead of the present standard of 1464. The other three trains Nos. SK.12; K. 22; and AK. 20 run full and overcrowded right from the start and collect large numbers whereever they stop. On one train, 600 passengers, and on another, 390 get in at Dombivli.

(c) Train No. K. 28 leaving Kalyan at 10-10 and reaching Victoria Terminus at 11-35 runs fairly full, but not overcrowded, because it runs after an interval of 52 minutes after an earlier one and the interval before the next one is another 30 minutes.

274. The number of passengers at the time of arrival of these trains at Thana is given in the table below:—

Train No.	Departure from Kalyan	Arrival at Victoria Terminus	No.of passengers on arrival at Thana
K. 18.	8–20	9–35	1311
NK. 8.	8–30	9–45	710
SK. 12.	8–45	9–50	1485
K. 22.	8–55	9–55	2145
* AK. 20.	9–07	10–20	1983
K. 26.	9–18	10–40	937
		TOTAL	8571

The overcrowding figures suggest that besides retiming NK. 8 and K. 26 to share the rush an additional train on this portion of the section is justified.

THANA–KURLA SECTION

275. (a) Among the trains reaching Victoria Terminus up to 9-30 hours, there is no overcrowding on this section with the only exception of AK 88,which was overcrowded between Ghatkopar and Kurla because of the failure of a previous train T. 4 with 1197 passengers at Ghatkopar and the need that arose to transfer about 800 passengers to it. Normally, this train would not be overcrowded on this section.

(b) Of the 12 trains on this section, timed to reach Victoria Terminus between 9-30 and 10–40, nine double unit Rakes run *via* the Main line and three single unit rakes run by the Harbour Branch. One, K. 22, runs past this section, without stopping at any station either on this section or at its end stations, Thana and Kurla. On the day in question, one of the Harbour Branch trains No. T. 112 was cancelled. Overcrowding is noticeable on:

(i) Harbour Branch Single Unit Train No.T.108 between Ghatkopar and Kurla, the maximum number being 850.

(ii) Kalyan Train No. K.18 right through the section, the maximum number being 1925.

(iii) Harbour Branch single unit train No. T. 110 between Bhandup and Kurla, the maximum number being 803.

(iv) Train No. SK. 12, right through, the maximum number being 1842.

(v) Train No. AK. 20 right through, the maximum number being 2403.

(vi) Train No. K. 26 right through the maximum number being 1763.

Trains marked * are already overcrowded when they arrive at Ghatkopar.

The three trains last mentioned are overcrowded by the time they enter this section and get further overcrowded as they proceed.

(c) Of the trains on the section, timed to reach Victoria Terminus after 10-40, overcrowding is noticeable on K. 28 only, which arrives on the section fairly full and gets overcrowded, the maximum number being 1605. This is due to this train being timed to run after an interval of over half an hour.

276. The requirements as judged from the above are:—

(i) An additional train suggested for the Kalyan-Thana section, if continued on this section also, will help to ease overcrowding.

(ii) The fast trains running through this section attract passengers, even though the trains are already overcrowded. This situation can be avoided, if stops of those fast trains are curtailed, and faster trains originating either at Thana, Ghatkopar or other stations are introduced to carry the city-bound traffic. To take the instance of Ghatkopar, 2376 passengers entrain between 9-02 and 10-08, many into trains that are already overcrowded, as will be seen from the table below:—

No. of Passengers entraining at Ghatkopar station in trains bound for Victoria Terminus

Train No.	Time	No. of passengers entraining at Ghatkopar
T 108*	9–02	173
K 18*	9–07	301
T 110*	9–18	146
SK 12*	9–26	353
T 14	9–27	338
T 16	9–35	190
T 18	9–48	215
AK 20*	9–54	396
K 26*	10–08	264
	TOTAL	2376

Trains marked * are already overcrowded when they arrive at Ghatkopar

If suitable fast trains were available from Ghatkopar, these already overcrowded trains would not get further overcrowded. Conditions would improve by extending Kurla trains to Ghatkopar and running them fast. For example, if K. 26 did not stop at Ghatkopar, 264 passengers that get into it would be cleared by CC. 22, which is running lighter. Similarly, if C. 16 and C. 20, which also run light, were extended to Ghatkopar and ran fast, 353 persons catching SK. 12 and 264 persons catching K. 26 could be diverted to them by eliminating the stops of the faster trains. The instances quoted above point to the necessity of running fast trains touching the larger stations and light shuttles (one unit trains) distributing passengers to the smaller stations. The stopping trains, at present run, do not attract a sufficient number of passengers.

KURLA–VICTORIA TERMINUS SECTION

277. (a) It will be observed that up to 8 hours, there is no rush on the trains and even though one train is cancelled at Ghatkopar, the effect on the following train is not significant.

(b) Between 8 and 9 hours, there were only five trains on the section, yet, the overcrowding is around Dadar only. The area over which overcrowding extends is greatest in the case of AK. 88 reaching Victoria Terminus at 8-16, and is much less on others. Overcrowding can be reduced if AK. 88, the long distance train from Ambernath, is made to skip certain stations, and an additional train introduced between Kurla and Byculla to serve the needs of the local traffic.

(c) Between 9-00 and 9-29, there are six trains on the section, only one of which is slightly overcrowded. This again, is a long distance train from Kalyan, which carries slightly above its capacity between Kurla and Byculla, the maximum number being 1694. The trains during this period are not particularly crowded when they reach Victoria Terminus and are not bringing in the office rush to that point. The 9 o'clock train and the 9-15 trains are not full, carrying less than half their capacity. So no additional trains are justified during this period.

(d) Between 9-30 and 10-30 hours, there are 12 trains of which one; C. 14 from Kurla timed to reach Victoria Terminus at 9-40 was cancelled and did not run on the day in question. The first train, No. T. 12, is from Thana reaching Victoria Terminus at 9-30. Overcrowding on it is confined to Dadar-Byculla section. The second train, No. K. 18, is a fast one from Kalyan, reaching Victoria Terminus, at 9-35; it brings in about 1900 passengers and becomes excessively overcrowded between Ghatkopar and Byculla, the number entraining being as follows:—

Thana	465
Ghatkopar	301
Kurla	261
Matunga	137

The highest number on this train touches 2135 at Kurla. The third from Kurla was cancelled as mentioned above, but its repercussions on the following two trains, did not cause excessive overcrowding. Following these trains, is the period of maximum rush to Victoria Terminus, when office-goers from the distant suburbs come packed in three trains, Nos. SK. 12; K. 22 and AK. 20 from Kalyan, arriving at 9-30, 9-55 and 10-20 respectively. Between them they bring in (2080+2065+2330)=6475 passengers. These trains are fast, are well patronized and run crowded right through.

The other four trains run full, while three out of them run overcrowded for the major part of the journey, but are not very popular with passengers for Victoria Terminus. They are stopping trains and serve to distribute traffic in the city area.

(e) After 10-30, there is no rush of passengers to Victoria Terminus and stopping trains originating from Kurla run only half full. The trains that do get overcrowded are from Kalyan, No. K 26 and K 28, touching Thana at 9-51 and 10-40. Long intervals between trains on the Kalyan-Kurla section lead to overcrowding in them.

278. The following table gives the maximum number of passengers at any time on the 14 trains that run into Victoria Terminus between 9-30 and 10-40:—

Sl. No.	Train No.	From Station	Arrival at Bombay V. T.	Carrying Capacity	Maximum Occupation
1	T. 12	Thana	9-30	1246	1675
2	K. 18	Kalyan	9-35	1246	2135
3	C. 14	Kurla	9-40	Cancelled on the date of Census.	
4	NK. 8	Kasara	9-45	1246	1215
5	C. 16	Kurla	9-50	1246	1098
6	SK. 12	Karjat	9-50	1246	2080
7	K. 22	Kalyan	9-55	1464	2145
8	T. 14	Thana	9-57	1464	1297
9	T. 16	Thana	10-12	1464	1890
10	C. 18	Kurla	10-17	1464	1909
11	AK. 20	Ambernath	10-20	796	2403
12	T. 18	Thana	10-25	1246	1588
13	C. 20	Kurla	10-35	1246	583
14	K. 26	Kalyan	10-40	1246	2055

The total number of passengers is 22,073, which, if divided by 1355, the average carrying capacity of Central Railway double unit trains, will give the number of trains required, 16, requiring the additon of two trains to 14, already running during this peak period of an hour and ten minutes. The average interval between trains remains 5 minutes, though a more frequent service will be needed to meet the heavy rush of passengers round about 10 hours. The utilization of both suburban and through lines exclusively for suburban traffic enables the railway to receive two trains simultaneously and to run in many more trains than would be possible if suburban traffic was restricted to suburban lines. The maximum rush in the morning is confined to a little more than an hour during which the headquarters office staff of the Railway (Central as well as Western) also travel. Since their number runs into several thousands, enquiries as to the trains by which they travel might furnish clues as to whether a change in the office hours of the railway will help to relieve rush to some extent.

VICTORIA TERMINUS–KURLA SECTION

Evening Rush

279. Extract from the corresponding census figures for trains leaving Bombay V. T. between 16-00 and 20-25 hours is in *Annexure* 32*. Up to 17-30 hours overcrowding is noticeable only on—

(i) K. 59, leaving V. T. at 16.25 for Kalyan. Overcrowding on this train occurs only as far as Thana, which is attributable to the longer interval between trains on Kurla-Thana section. This train runs 25 minutes after the preceding train and is followed by a train 15 minutes later.

(ii) T. 47, leaving V. T. at 17-30 for Thana. Overcrowding is local between Parel and Matunga, where the maximum number reached is 1760 against the carrying capacity of 1464.

By re-adjustment of stops, overcrowding, which in any case is not excessive, can be corrected in either train.

280. After 17-30 and up to 18-39, there are 11 trains, all of which are overcrowded, the only exception being U 7, which leaves V. T. at 17-55 hours for Matunga. This train fills up to Chinchpokli only. The overcrowding on the other 10 trains is to be found only between V. T. and Kurla, except for AK 65, which leaves V. T. at 17-35 and runs non-stop between Dadar and Mumbra. This is a hot favourite with the long distance passengers. The maximum number of passengers on each of these trains are given in the table below:—

Central Railway–Main Suburban line

Between 17-30 *Hrs. and* 18-35 *Hrs.*

Sl. No.	Train No.	From Station	Departure from Bombay. V. T.	Carying Capacity	Maximum Occupation
1	AK.65	Ambernath	17-35	1464	1569
2	T. 49	Thana	17-40	1246	1807
3	MK. 67	Kasara	17-45	1246	1655
4	C. 77	Kurla	17-50	1246	1503
5	U. 7	Matunga	17-55	1246	1144
6	SK. 69	Karjat	18-00	1246	1478
7	T. 51	Thana	18-05	1246	1640
8	AK. 71	Ambernath	18-10	1464	1521
9	T. 53	Thana	18-18	1464	1962
10	C. 79	Kurla	18-23	Cancelled.	
11	K. 73	Kalyan	18-35	1464	2198

The total of passenger comes to 16773 which require 12.5 trains or an extra two trains to bring down the average to 1350 per trains. There is no overcrowding beyond Kurla.

281. After 18-35, overcrowding is only sporadic and small, the fast trains being the most popular, as seen from the following:—

(i) VK. 75, leaving V. T. at 18-50 runs overcrowded up to Thana, the maximum, 1922 passengers being at Byculla.

(ii) SK. 77, leaving V.T. at 19-00 hrs, run overcrowded up to Ghatkopar, the maximum, 1554 being at Byculla.

(iii) T. 55, which leaves V. T. at 19-10, runs overcrowded up to Byculla, the maximum being 1515.

(iv) NK. 79, which leaves V. T. at 19-20, runs overcrowded upto Kurla, the maximum being 1664.

(v) VK. 81, leaves V. T. at 19-40 and runs overcrowded up to Kurla, the maximum being 1800.

Considering that overcrowding is neither excessive nor for long, no extra trains seem justified. An adjustment of stops might lead to a more even distribution.

---

*Not Printed.

KURLA–THANA SECTION

282. In the evening rush, trains leaving V. T. up to 17-30 are not overcrowded, except for:

(i) No. K. 59, leaving V. T. at 16-25. This runs overcrowded almost right through, and has already been referred to previously.

(ii) No. T. 143, which leaves V. T. at 17-10, runs overcrowded between Kurla and Ghatkopar only, the number of passengers being 804.

283. Trains leaving V. T. after 17-30 do not get overcrowded, except for:

(i) NK. 67, leaving V. T. at 17-45, which stops at Ghatkopar only, on this section It arrives at Ghatkopar with 1655 passengers and leaves it with 1292.

(ii) VK. 75, leaving V. T. at 18-50. On it, overcrowding is up to Thana. The number of passengers at Kurla was 1633, and it came down to 947 when the train left Thana.

THANA–KALYAN SECTION

284. On the Thana-Kalyan section, there is no overcrowding in the evening rush except on AK. 65, mention of which has already been made. It runs non-stop from Dadar to Mumbra, without halting at Thana, and carries 1569 passengers. All other trains are only partially filled, some even to less than half their carrying capacity.

HARBOUR BRANCH

285. The Harbour Branch passenger traffic is drawn from two directions.

(i) From Mahim and further—The majority of trains originate at Bandra but 4 originate at Andheri.

(ii) From Kurla —In this case, trains originate either from
(i) Kurla,
(ii) Mankhurd
or
(iii) Thana on the Main line.

286. Extract from the census figures taken on 2-12-55 (Friday) for trains arriving at Bombay V. T. between 6-05 and 11-00 hours is in *Annexure* 33*. The table below gives particulars of trains, coming into Victoria Terminus between 8-45 and 11-00 hours and their occupation. It is arranged to bring out distinctly the particulars of trains of each of the two sides:

Train No.	Time of arrival at Victoria Terminus	Number of passengers detraining at Victoria Terminus	Maximum No. of passengers on the train	Station at which maximum is touched	No, of passengers at Kings Circle
B 16	8-45	750	1210	Sewri	990
B 18	9-00	580	1100	Cotton Green	915
T 106	9-05	879	980	Cotton Green	
M 24	9-15	412	599	Reay Road	
B 20	9-20	647	986	Vadala Road	975
C 124	9-25	Cancelled.		Cancelled.	
M 26	9-30	347	489	Vadala Road	
B 24	9-35	853	1083	Sewri	1005
T 108	9-40	694	1078	Vadala Road	
AB 22	9-45	936	1172	Vadala Road	1125
T 110	9-50	657	925	Vadala Road	
B 26	10-02	505	715	Vadala Road	705
M 28	10-10	409	625	Sewri	
B 28	10-17	644	748	Sewri	640
C 160	10-25	272	435	Cotton Green	
T 112	10-35	Cancelled.		Cancelled.	
B 30	10-40	422	591	Dock Yard Road	585
C 128	10-45	63	92	Dock Yard Road	
B 32	11-00	331	611	Sewri	580

*Not Printed.

It will be observed that the number of passengers coming into Victoria Terminus is high for a single unit train in the case of—

(i) No. B. 24 coming from Bandra and reaching V. T. at 9-35 with 853 passengers.

(ii) No. AB. 22 coming from Andheri and reaching V. T. at 9-45, with 936 passengers.

None of the other trains can be said to be overcrowded at the time they reach Victoria Terminus. T. 106 does bring 879 passengers, but it is a double unit train with carrying capacity is excess of requirements. If we look at the overcrowding that takes place on these trains during their run, one Andheri train, four Bandra trains and two Thana trains are excessively overcrowded, but this condition, in our opinion, is due to the manner in which trains are run on this section. We will refer to this aspect later.

287. Evening traffic on this branch in the other direction is indicated in the table that follows; extract from the corresponding census figures for trains leaving Bombay V. T. between 15-00 and 20-55 hours are at *Annexure* 34*.

Train No.	Time of Departure	No. of passengers leaving V. T.	Maximum No. of passengers	Remarks about stations where maximum overcrowding takes place
B 65	15–55	179	233	Kings Circle
C 135	16–10	375	718	Sewri
B 67	16–20	900	1653	Kings Circle
C 137	16–30	340	520	Vadala Road
B 69	16–36	355	1044	Sewri to Kings Circle
C 139	16–50	275	639	Sewri
B 71	17–05	455	1349	Sewri
T 143	17–10	285	804	Kurla
M 61	17–15	310	808	Sewri
B 73	17–22	465	1191	Sewri
M 63	17–30	275	671	Vadala Road
B 75	17–40	475	1311	Sewri
T 145	17–50	285	727	Vadala Road
M 65	18–00	385	861	Sewri—at Kurla this train gets 650 passengers
B 77	18–05	390	763	Sewri
T 147	18–13	455	642	Sandhurst Road
B 79	18–23	485	870	Reay Road
T 149	18–36	410	646	Masjid
B 81	18–45	595	970	Runs overfull throughout
AB 83	18–53	495	819	,, ,, ,,
T 151	18–58	395	719	,, ,, ,,
B 85	19–12	595	796	,, ,, ,,
T 153	19–22	510	734	,, ,, ,,
B 87	19–30	495	709	,, ,, ,,
AB 89	19–45	495	860	Sandhurst Road

---

* Not printed.

Train No.	Time of Departure	No. of passengers leaving V. T.	Maximum No. of passengers	Remarks about stations where maximum overcrowding takes place
T 155	19-55	580	860	Runs overfull up to Kurla
C 141	20-05	345	540	Sandhurst Road
B 91	20-13	330	516	Sandhurst Road
T 157	20-30	315	455	Masjid
B 93	20-35	385	505	Reay Road

N. B. Figures underlined in Col. 1 indicate that rakes are composed of double units.

The numbers of trains that are run with Double units are underlined for facility of reference, and none of them run excessively overcrowded, though the number of passengers on them is large. Of the Bandra trains, B. 65, leaving Victoria Terminus at 15-55 runs less than half full and that indicates that this train is timed to run before the evening rush starts. The next train for Bandra, B. 67, leaves after an interval of 25 minutes, and starts with 900 passengers from Victoria Terminus, which is less than its carrying capacity. It gets overcrowded between Reay Road and Kings Circle. Although we have no data positively to confirm that a large number of passengers entraining at Victoria Terminus travel through to Bandra, there is every indication that passengers travelling from end to end predominate and prefer to go by this and other trains on this route, notwithstanding the quicker alternative of faster trains *via* Dadar, which involves a change. Other Bandra trains do not start with quite as many passengers from Victoria Terminus but they pick up more and more within the next few stations and get overcrowded in much the same way. Five trains, B. 71 to B. 79, run as double units, offer ample capacity throughout the run, and cannot be said to be overcrowded at any point. The next four trains, B. 81 to B. 87, run full throughout the journey, and some of them even get overcrowded. AB. 89, leaving at 19-45, is a double unit train, which does not fill up to its capacity at any point on the run, the maximum number being 860 only.

This marks the end of the rush and the later trains run lightly loaded.

288. To relieve overcrowding on the Mahim side trains on the Harbour Branch, the following alternatives are available:

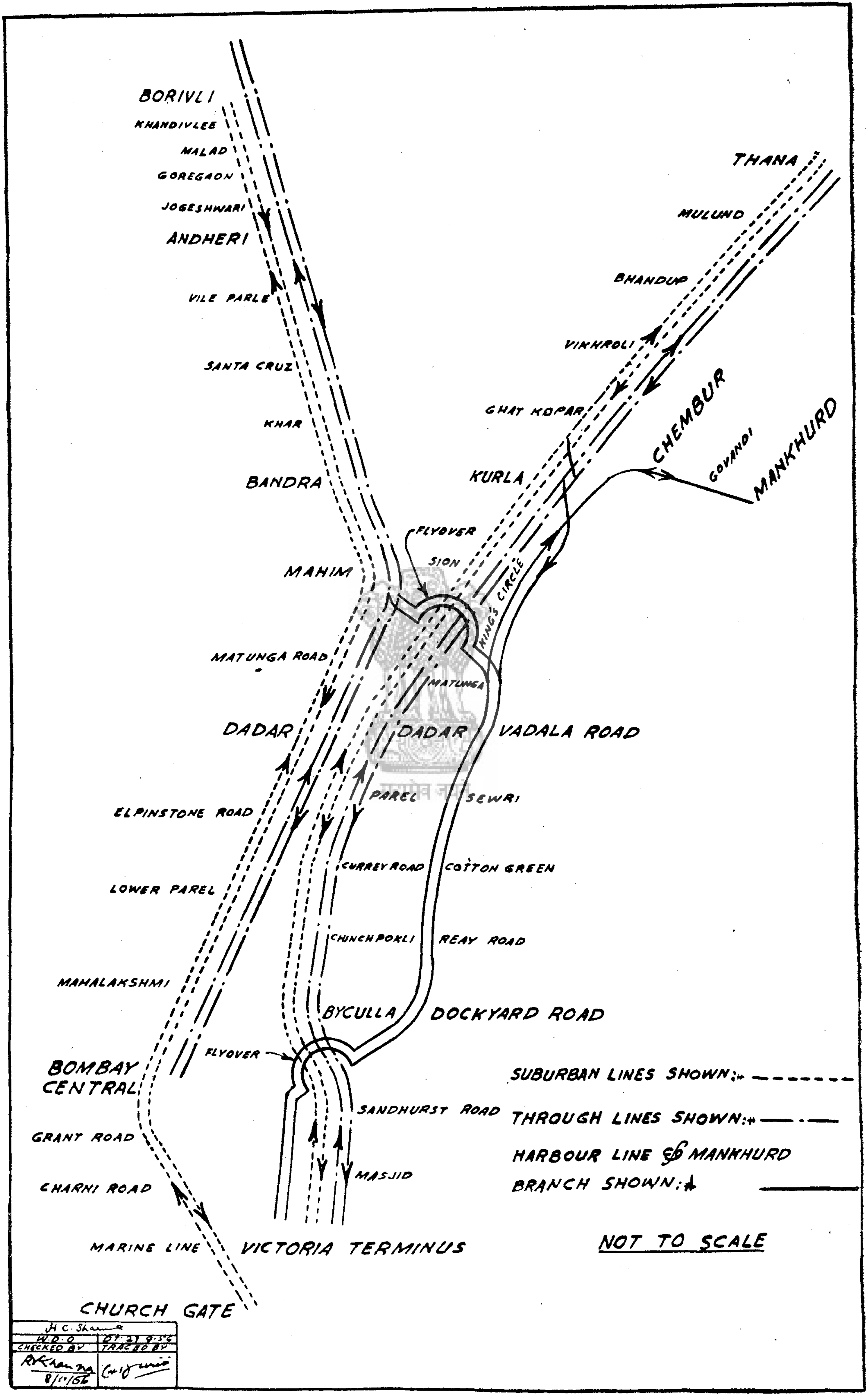
(i) to run more double unit trains;

(ii) to run more trains.

Running more double unit trains requires extra stock, which is neither readily available to the Railway, nor economical on this service, which is a slow one with stoppages on each train at every station. The alternative of running more trains, besides involving the two drawbacks of want of stock and uneconomical utilization on slow services has an additional disadvantage in that these trains interfere with the free flow of traffic on the Western Railway through lines, and any additions made to them will cause further dislocation on that Railway and affect punctuality. The natural demand under the circumstances is for the provision of separate lines for dealing with Central Railway trains from Mahim to Bandra and there is considerable force in it. The demand, if met, will considerably simplify operation and improve punctuality and efficiency on both the Western and Central Railways. Why it has not been conceded so far is largely due to the expense involved in constructing a viaduct over the creak between Mahim and Bandra. If and when that extension is provided, the service to Bandra will be accelerated and simplified, but trains to Andheri will still interfere with Western Railway trains, and in turn evoke demands for extensions of the additional lines to Andheri and even beyond, to Borivli or Virar.

289. In our opinion, the duplication of lines on the Western Railway to run Central Railway trains is not justified, and we favour the idea of Central Railway trains terminating at Mahim on a separate platform line to be provided there. Adequate transfer facilities of the most modern type might be provided there, to enable passengers to transfer without much fatigue and trouble at this station from and to Western Railway trains, so that trains of both railways can run freely, without interfering with each other, or affecting the punctuality and regularity of services. A more intensive service can then be introduced between Mahim and V. T. and the long gaps of 16 to 29 minutes brought down to 5 or 8 minutes.

290. To begin with, only a single platform and line at Mahim ought to suffice, for rakes that come on to it should be able to return within 3 or 4 minutes. Space should, however, be reserved for additional platforms and lines needed, if the traffic developed further and


BORIVLI
KHANDIVLEE
MALAD
GOREGAON
JOGESHWARI
ANDHERI
VILE PARLE
SANTA CRUZ
KHAR
BANDRA
MAHIM
MATUNGA ROAD
DADAR
ELPINSTONE ROAD
LOWER PAREL
MAHALAKSHMI
BOMBAY CENTRAL
GRANT ROAD
CHARNI ROAD
MARINE LINE
CHURCH GATE
THANA
MULUND
BHANDUP
VIKHROLI
GHAT KOPAR
KURLA
CHEMBUR
GOVANDI
MANKHURD
FLYOVER
SION
KING'S CIRCLE
MATUNGA
DADAR
VADALA ROAD
PAREL
SEWRI
CURREY ROAD
COTTON GREEN
CHINCHPOKLI
REAY ROAD
BYCULLA
DOCKYARD ROAD
FLYOVER
SANDHURST ROAD
MASJID
VICTORIA TERMINUS
SUBURBAN LINES SHOWN:-
THROUGH LINES SHOWN:-
HARBOUR LINE & MANKHURD BRANCH SHOWN:-
NOT TO SCALE
H C. Sharma
W.D.O.
DT. 27 9.56
CHECKED BY
TRACED BY
R K Khanna
8/10/56

preferred this route to the alternative of changing at Dadar. In that event, the duration of the run between Mahim and V. T. could be at times reduced by skipping certain stations on the route, when trains run in quick succession.

291. An examination of trains running to the other direction indicates that:

(i) the Kurla trains do not get overcrowded, but Thana and Mankhurd trains do, to a greater extent.

(ii) Overcrowding generally occurs at Kolwada or Vadala Road. This points to the necessity of introducing some shuttles between Chembur and Vadala Road.

The following table gives the number of passengers at Kolvada:—

Train No.	Time	Interval between trains	Passengers		
			Detraining	In the train	Entraining
T 164	6–03	..	5	325	95
M 12	6–20	17	14	799	75
M 14	6–38	18	46	867	170
M 16	7–10	32	56	1645	290
T 102	7–45	35	44	1300	220
T 104	8–10	25	38	861	45
T 106	8–40	30	40	782	70
M 24	8–50	10	45	503	70
C 124	9–00	10	Cancelled.		
M 26	9–05	5	35	484	45
T 108	9–14	9	65	1038	199
T 110	9–29	15	40	830	70
M 28	9–44	15	35	526	30
C 160	10–00	16	25	381	195
T 112	10–10	10	Cancelled.		
C 128	10–20	10	10	56	45

It is brought out from the above that train service is most infrequent when traffic is most intense and a re-adjustment of the service is therefore necessary. The rush of passengers comes between 7-00 and 8-00 hours when train intervals of 35 minutes are too long to satisfy the needs of traffic.

In regard to Thana trains, it appears that they cater for the needs of passengers to Ghatkopar, and supplement main suburban line trains which run through without stopping at stations between Kurla and Thana. In this connection, the lay-out of Kurla yard has to be examined, when it will be seen that direct connections only exist for extension of Main line trains to Thana, but Harbour Branch trains have to cut across Up and Down through lines, as well as the main suburban lines. This move is even more complicated than that at Mahim since Harbour Branch trains are made to stop at every station between Kurla and Thana and have, therefore, to use suburban lines, there being no platforms along through lines at these intermediate stations. Opinion on the Central Railway is veering towards providing these platforms, but we cannot see much point in this move. We are of the opinion that Harbour Branch trains should not be made to cut across through lines in Kurla yard; they should either terminate at Kurla, or be extended on to Mankhurd branch up to Chembur or Mankhurd as the traffic may justify. Service up to Thana should be supplemented by running additional main suburban line trains, for no cross cutting is involved in these movements. If stopping trains are run with single units, and fast trains with double units, a more extensive service would be possible. Our remarks about irregularity and unpunctuality caused at Mahim apply with even greater force here, and we cannot too strongly suggest a close study of the lay-out of the various lines and the simplification of train running. A lay-out diagram is attached for ready reference. This, for simplicity's sake, does not show yard lay-outs but diagrammatically indicates the various routes and how they intersect and interfere with each other and why it is necessary to simplify the routing of trains.

KURLA–MANKHURD BRANCH

292. The morning rush is towards Kurla and the census of passenger traffic on Friday, the 2nd December, 1955, indicates that overcrowding is confined to the 1¼ mile section between Chembur and Kurla to the extent indicated in the table below:—

S.No.	Train No.	Arrival time at Kurla	Carrying Capacity	Maximum occupation	Stations between which there is overcrowding
1	M. 8	5–00	1448	668	..
2	M. 10	5–39	724	604	..
3	M. 12	6–15	724	802	Between Chembur and Kurla
4	M. 14	6–31	724	783	Ditto.
5	M. 16	7–00	623	1336	Ditto.
6	M. 18	7–14	724	1199	Ditto.
7	M. 20	7–48	724	895	Ditto.
8	M. 22	8–22	724	480	..
9	M. 24	8–43	623	622	..
10	M. 26	8–59	724	731	Between Chembur and Kurla.
11	M. 28	9–37	724	788	Ditto.
12	M. 30	10–19	724	403	..
13	M. 32	10–53	724	358	..
14	M. 34	11–27	724	418	..

NOTE :—The train numbers of the through trains to Bombay V.T. are underlined.

Overcrowding is excessive only on M 16, M. 18, and M. 20 and that for the very short run of 6 minutes duration. If speeds over the section are raised, the time of run is capable of reduction.

In the evening, rush is towards Mankhurd and the table below gives the maximum number of passengers noticed on Friday, the 2nd December 1955:—

S.No.	Train No.	Departure time from Kurla	Carrying capacity	Maximum occupation	Stations between which there is overcrowding
1	M. 55	16-00	724	567	..
2	M. 57	16-41	623	725	Kurla and Chembur.
3	M. 59	17-15	623	780	Ditto.
4	M. 61	17-45	724	989	Ditto.
5	M. 63	18-01	623	824	Ditto.
6	M. 65	18-30	1448	1218	..
7	M. 67	19-11	623	810	Kurla and Chembur.
8	M. 69	19-45	623	812	Ditto.
9	M. 71	20-19	623	750	Ditto.
10	M. 73	20-53	623	550	..
11	M. 75	21-27	623	570	..
12	M. 77	22-01	623	350	..

NOTE :—The train numbers of the through trains from Bombay V.T. are underlined.

It will be seen that overcrowding is by no means excessive except in train M. 61. In any case, this is limited to a short run between Kurla and Chember, M. 65 attracts large numbers, but this is a double unit train and the number of passengers is below the carrying capacity of the train. Train intervals vary from 16-to 41 minutes, as trains are run all the way from Victoria Terminus. A more intensive and regular service could be ensured, if trains during rush periods shuttled between Vadala Road and Chembur to clear the short distance traffic while the through trains from Victoria Terminus to Mankhurd run at longer intervals to cater for the longer distance passengers. Single unit trains with all standing accommodation or with a very limited number of seats should be very suitable for these shuttles.

CHAPTER III

MADRAS SUBURBAN RAILWAY SYSTEM

Madras Terminals

301. Unlike Calcutta and Bombay, which are served by the broad gauge only, Madras is served both by the broad and the metre gauges with their Main Line termini respectively at Madras Central and Egmore. These stations are separated by a distance of a mile and are inside the city area of Madras. The Madras Harbour is served by both the broad and metre gauges; and because this area is by the side of main commercial centre, a considerable volume of passenger traffic is attracted to it. Madras Beach is a terminal station connecting Madras Egmore by the electrified metre gauge and Madras Central by the round about broad gauge route *via* Rayapuram and Basin Bridge. The suburban railway sections of Madras are shown in the map, *Annexure* 3.

Broad Gauge System

302. The Broad Gauge Main line extends from Madras Central, its terminal in the city, to Basin Bridge (Mile 1¼), where it bifurcates into two routes, one to the north-east and the other to the west. The former is the Main Line running to the north-east *via* Bezwada while the latter serves the western part of the country *via* Arkonam. The Madras Suburban section extends upto Gummidipundi (mile 29) on the former and upto Trivellore (mile 26) on the latter.

Metre Gauge System

303. The metre gauge suburban section extends upto Chingleput 37 miles from Madras Beach and is operated for part of the way by electric trains and for the rest by steam trains. Starting from Madras Beach the section is an electrified double line section 18 miles long terminating at Tambaram; and 2¾ miles away from Madras Beach is located Madras Egmore the main line terminus of the metre gauge where all main line steam trains are terminated. Thus for a distance of 16 miles between Madras Egmore and Tambaram we have both the electrified double line section for dealing with suburban passenger traffic and the non-electrified single line steam sections for dealing with through passenger and goods traffic. This line is the only metre gauge connection of Madras with the rest of the vast metre gauge net work in the South, and the limits of the suburban section along this single line are fixed at Chingleput Junction.

Whereas the electrified section between Madras Egmore and Tambaram has platforms for dealing with passenger trains, at 10 stations no platforms have been provided along the steam line between Tambaram and Egmore, and so all passenger trains on this line run non-stop between these two stations. Between Chingleput and Tambaram there are 5 stations on the steam section. On the electrified section between Egmore and Beach, there are only two stations Park and Fort at which both electric trains and steam trains stop, the most important of these being the Park station which attracts the largest number of passengers during rush hours. Park station is only 2½ furlongs from Central station by road and is in the busy city area. Electric trains take about 48 to 50 minutes to make the run between Madras Beach and Tambaram while steam trains that run between Madras Beach and Chingleput take 1½ hour to 1¾ hour.

Composition of Metre Gauge Suburban Trains

304. The suburban service between Madras Beach and Tambaram is run with EMU stock. There are 24 units provided for use on this section out of which 18 are in service daily and the remaining 6 are set aside for servicing purposes. The units are articulated and consist of 1 motor coach and 2 trailers. During rush hours bogie third class coaches (YTs.) are also attached as trailers to EMU trains. The EMU stock is mostly run as single unit trains, except during rush hours when it is run as double units. Out of the 101 trains run per day in the Down direction 60 are single units and the rest double units. Besides the EMU stock, there are 4 electric locomotives of which 3 are in service daily, and one is set apart for maintenance. They are capable of hauling 5 coach trains. The Southern Railway also run during the morning two steam hauled trains from Conjeevaram to Madras Beach by the non-electrified line up to Egmore and onwards from Egmore to Beach ~~station on~~ ~~the~~ electrified

5—1 D. T. (Rly. Bd.) 56.

line. They return during the evening rush period. The portion of the EMU stock set apart for maintenance purposes in Madras works out to 25% of the total units that are available. Comparative figures of the Central and Western Railways are 16·4 and 15·4 respectively. Unlike Bombay, servicing hours here are not confined to the slack period of the day as their repair shed is at the farthest end of the electrified section and a unit is out of use for servicing during morning and evening rush periods which would not be the case if this work could be done in the midday slack period. This alternative, however, involves a change in working hours of the shops or the provision of servicing facilities in the vicinity of Madras Beach. The rake links of the EMU stock of the Southern Railway have been so prepared that single units are utilised as far as possible during non-rush hours and double units during rush hours:

Guindy marks the mid-point on the section Beach to Tambaram, traffic on the Tambaram side being lighter than on the other. It is equipped to attach and detach units enabling single unit trains to be doubled and *vice versa*.

On the electric trains, two classes of travel are provided. A compartment is reserved for ladies in Class III but none in the Upper class. There are no toilet facilities. A small compartment is set aside for Guard and luggage.

EMU Trains

305. The carrying capacities of the Electical Multiple Unit trains, are as given below:—

Each Electrical Multiple Unit stock provides the following accommodation:

		Seats
(i)	Driving Compartment	...
	Compartment for ladies III	14
	General Compartment III	58
(ii)	Luggage	...
	I Class compartment in two sections	30
	III Class compartment	22
(iii)	Ladies Compartment III	14
	General III	58
	Driving Compartment	...

Class	I	Seats	30
Ladies	III	,,	28
General	III	,,	138
		TOTAL	196

Summary:

Single Unit	Seats	196
Single Unit with YT	,,	284
Accommodation on a double unit.	,,	392
Accommodation of a double unit with YT	,,	480

There is very little standing room in the EMUs, and the carrying capacity is marked on the coaches for seating passengers only.

Electric Engine Hauled Trains

306. Each one of the Electric Engine hauled trains has the following accommodation :—

		Seats
Class	I	50
Class	III	352
	TOTAL	402

Steam Hauled Trains

307. The two steam hauled trains provide the following accommodation:—

(1)		(2)	
Class I . . .	16	Class I	12
Class II . . .	8	Class II	36
Class III . . .	403	Class III	388
TOTAL .	427	TOTAL	436

Frequency of Train Service

308. The train chart, *Annexure* 15*, details the trains arriving at Madras Beach. 100 trains arrive per day, there being no train from midnight to 4 hours. From the hourly total at the bottom of the chart, it will be seen that 9 is the largest number of trains and these trains arrive between 9 and 10 hours in the morning, while 7 arrive in the preceding hour and 6 in the following hour. Of the 9 trains received between 9 and 10 hours

1 runs as a single unit from Tambaram and a second unit is attached at Guindy.
1 with a single unit with a 3rd class bogie (YT) and to this a second unit is attached at Guindy
2 run as double units
2 run as double units with bogie thirds
2 are steam trains from Chingleput and beyond
1 is an Electric Engine hauled train.

The minimum headway between trains is 5 minutes, but longer intervals are the rule. Steam trains run on the steam line except between Egmore and Madras Beach, where they run in between Electric trains and that is where the minimum headway gets reduced to 5 minutes as the electric train which runs with 8 mts. headway is made to lose a couple of minutes on the run.

The steam trains run on the non-electrified line upto Egmore, but at Egmore they are dealt with on the electrified line, which makes it necessary for the electric train to wait beyond Egmore. Dislocation in service takes place when the steam train happens to be late and having lost its path has to be accommodated at Egmore to the exclusion of the electric train.

309. In the reverse direction, the train chart of trains leaving Madras Beach, *Annexure* 16* indicates that there are 101 trains in the day and there is no train from midnight to 4 hours. The maximum number of trains per hour is 8 and that is maintained for 3 consecutive hours from 16 to 19 hours. As in the previous case there is a mixture of types of trains which run in each hour. Between 16 and 17 hours 2 are single units trains which run from Beach to Guindy only, 4 others are single units running all the way from Beach to Tambaram, one is a double unit right through while another starts as a double unit, but detaches one untit at Guindy.

Between 17 and 18 hours there are 3 double unit trains running from Beach to Guindy only, while 3 double unit trains run as far as Tambaram. One steam train leaves Beach station for Chingleput and beyond and another electric engine hauled train leaves Beach during this hour making a total of 8.

Between 18 and 19 hours two trains are single units, one is a double unit to Guindy only, one runs as a double unit to Guindy, where it detaches one unit while another single unit goes up to Tambaram, one is a steam train to Chingleput and beyond, while one is Electric engine hauled train. The remaining two are double units to Tambaram.

Passenger Traffic and Train Requirements

310. The census of passengers for the morning city-bound rush on Tuesday, the 17th January, 1956, is given in *Annexure* 35*. The section is divisible into two almost equal sub-sections at Guindy but since St. Thomas Mount is a heavy booking station adjoining Guindy on the sub-section Tambaram to Guindy, it will help our analysis if we further subdivide this section into two and consider them separately for the time being.

---

* Not printed.

The following table summarizes the results of census the carrying capacities and the maximum number of passengers found on the trains in the different sections :—

Tambaram–Madras Beach

Train No.	Type	Time of arrival at Beach	Carrying capacity	Maximum number of passengers on the train on the section		
				St. Thomas Mount to Guindy	Tambaram to St. Thomas Mount	Guindy to Madras Beach.
E.30	Single	08.01	196	209	209	358
E.32	Single	08.10	196	169	169	309
E.34	Double	08.21	392	123	123	372
E.36	Single	08.29	196	..	..	273
E.38	EG	08.37	397	196	196	307
E.40	S	08.48	196	206	206	..
	D		392	..	..	501
E.42	Single	08.55	196	132	132	367
E.44	Single	09.06	196	232	232	551
E.46	Double	09.14	392	327	265	664
E.48	D+ YT	09.22	480	341	262	865
642	Steam	09.27	411	RT	359	359
E.50	S+ YT	09.32	284	205	140	760
E.52	EG	09.41	330	410	310	878
E.54	D+ YT	09.47	480	311	255	576
646	Steam	09.52	440	RT	342	342
E.56	Double	09.57	392	447	320	992
E.58	S+ YT	10.05	284	261	163	609
						5,344
E.60	Single	10.12	196	340	293	434
E.62	Single	10.21	196	217	169	387
E.64	Single	10.32	196	167	128	468
E.66	Single	10.41	196	127	112	303
E.68	Single	10.52	196	114	92	309
E.70	Single	11.00	196	109	91	245

NOTE.—1. 'S' indicates 'Single Unit'.
'D' indicates 'Double Unit'.
'S+YT' indicates 'Single Unit with a 3rd Class bogie'.
'D+YT' indicates 'Double Unit with a 3rd class bogie'.
'EG' indicates 'Train hauled by Electric Engine'.
'Steam' indicates 'Train hauled by Steam Engine'.

2. In the column of carrying capacity, when two figures are given against a single train, the lower figure applies to the section Tambaram-Guindy and the higher to Guindy-Beach as the composition of train gets altered at Guindy in that case.

3. There are two steam trains reaching Beach at 9-27 and 9-52. These run non-stop between Tambaram and Egmore stations and so figures for the St. Thomas Mount-Guindy section are not given separately.

Dealing with the eight trains reaching Beach up to 9-06 on the (1) Tambaram-Mount section, there is no overcrowding. E. 30 and E. 44 timed to reach Beach at 08-01 and 9-06 respectively did carry 13 and 36 passengers more than the marked seating capacity of the train but this cannot be reckoned as overcrowding. (2) St. Thomas Mount-Guindy section—The position is similar to the above section. (3) Guindy-Beach section—all trains were overcrowded except E. 34 a double unit train timed to reach Beach at 8-21. Of the 5 single unit trains, 4 would not have been overcrowded, if they were double unit ones, and overcrowding on the 5th too would not occur if it had an additional coach in addition to having double units and standing accommodation was provided.

Dealing with nine trains reaching Beach between 9-14 and 10-05 hrs. on the (i) Tambaram-Mount Section, all trains carried passengers well below their carrying capacity. (ii) Mount-Guindy Section—the position was similar to the above section except that two trains E. 52 and 56 carried in excess of their capacity. (iii) Guindy-Beach section—all trains were excessively overcrowded except for a steam train No. 646. Passengers carried were often more than twice the capacity. Excluding the steam trains, the total of the maximum number on the 7 trains was 5344 giving an average of 763 per train. Nine to ten trains of increased capacity composed of double units with a third class bogie in between would be required to obviate excessive overcrowding. In addition, the steam trains, that run underload should be stopped at some stations to fill up.

Dealing with the six trains reaching Beach between 10-12 and 11-00 hours, it will be observed that they were all single unit trains and on the (i) Tambaram-Mount Section, only one train E. 60 reaching Beach at 10-12 was overcrowded, the rest being well below their seating capacity. (ii) Mount-Guindy Section, two trains E. 60 and 62 carried more than the marked seating capacity, whilst all later trains were not filled to capacity. (iii) Guindy-Beach Section, all the six trains carried very many more than the marked capacity. In two cases, the maximum number was more than twice the capacity. To obviate excessive overcrowding the section would require to have all trains to be run as double units with an additional coach. An increase in the number of trains is not called for during the interval.

311. For the evening out-bound rush, the census figures for Tuesday the 17th January 1956 are given in *Annexure* 36*, and the following table compiled on the same lines as for the morning rush summarises the results of census.

Madras Beach–Tambaram

Train No.	Type	Time of Departure from Beach	Carrying capacity	Maximum number of passengers on the train on the section		
				Beach-Guindy	St.Thomas Mount(—) Tambaram	Guindy-St. Thomas Mount
E.115	Single	16.03	196	266	97	154
E.117	Single	16.13	196	248	106	141
E.119	Single	16.20	196	292		
E.121	D+ YT	16.27	480	576	352	453
E.123	Single	16.35	196	264		
E.125	Single	16.43	196	428	386	366
E.127	Single	16.51	196	446	176	227
E.129	D+ YT	16.59	480	469	..	..
			196	..	92	128
E.131	Double	17.07	392	509		
E.133	Double	17.15	392	924	362	446
E.135	Double	17.22	392	851		
E.137	Double	17.29	392	783	287	378
647	Steam	17.35	440	247	241	RT
E.139	EG	17.41	397	662	164	240
E.141	Double	17.47	392	537		
E.143	Double	17.56	392	462	94	151
641	Steam	18.01	411	279	279	RT
E.145	EG	18.08	330	834	192	242
E.147	Double	18.15	392	502	..	..
			196	..	51	101
E.149	Double	18.24	392	556		
E.151	Double	18.32	392	715	115	228
				8330		
E.153	Single	18.40	196	443	78	102
E.155	Double	18.47	392	510	67	102
E.157	Single	18.56	196	782	385	434
E.159	Double	19.06	392	681	87	147
E.161	Single	19.16	196	610	212	255
E.163	Double	19.26	392	607	183	218
E.165	Single	19.36	196	460	118	171

---

*Not Printed.

Train No.	Type	Time of Departure from Beach	Carrying capacity.	Maximum number of passengers on the train on the section.		
				Beach Guindy	St. Thomas Mount(—) Tambaram	Guindy-St. Thomas Mount
E.167	Double	19·46	392	632	159	187
E.169	Single	19·56	196	356	43	83
E.171	Double	20·09	392	581	27	85
E.173	Single	20·18	196	175	11	19
E.175	EG	20·28	330	293	15	17
E.177	Single	20·37	196	323	19	27
E.179	Double	20·47	392	178	56	63
E.181	Single	20·57	196	218	31	42

NOTE.— 1. 'S' indicates 'Single Unit'.
'D' indicates 'Double Unit'.
S+YT indicates 'Single Unit with a 3rd class bogie'.
D+YT indicates 'Double Unit with a 3rd class bogie'.
'EG' indicates 'Train hauled by Electric Engine'.
'Steam' indicates 'Train hauled by Steam Engine'.

2. In the column of carrying capacity, when two figures are given against a Single train, the lower figure applies to the section Guindy-Tambaram and the higher to Beach-Guindy as the composition of train gets altered at Guindy in that case.

3. There are two steam trains leaving Beach at 17-35 & 18-01. These run non-stop between Egmore and Tambaram stations and so figures for the Guindy (—) St. Thomas Mount section are not given separately.

Dealing with trains leaving Beach between 16-03 and 16-51, it will be observed that all trains except one were single unit trains at an average interval of 8 minutes , and each one of them was overcrowded excessively between Beach and Guindy. Between Guindy and St. Thomas Mount, two trains were overcrowded, whilst the three earlier trains carried less than their capacity. On the section St. Thomas Mount to Tambaram, only one train was overcrowded, all others carrying less than their marked seating capacity. Overcrowding of the trains on the Guindy-St. Thomas Mount-Tambaram section would be avoided, if trains E. 119 and 123 were extended to Tambaram instead of being terminated at Guindy and that on the Beach-Guindy section would be materially reduced, if trains on this section had double units with a coach added to it.

Dealing with the 14 trains leaving Beach between 16-59 and 18-32 it will be observed that they run at an average interval of about 7 minutes. There are 2 steam trains which run non-stop between Egmore and Tambaram, two are hauled by Electric Engines, while the rest are all double units of which one has in addition a bogie coach. The steam trains are not full to capacity, and only E. 129 is slightly below its capacity, while all others are excessively overcrowded on the section Beach to Guindy. Beyond Guindy, upto St. Thomas Mount only E. 133 runs overcrowded, whilst all others carry below their capacity. Between St. Thomas Mount and Tambaram, no single train is overcrowded. The total of the maximum numbers on these 14 trains between Beach and Guindy comes to 8330, which will require 16 trains composed of double units, each one of which is to be reinforced with an extra coach. In cases where steam or electric engine hauled trains are run, they should have an equivalent capacity or as large a capacity as can be obtained. On the Guindy-Tambaram section, the total of the maximum numbers excluding steam trains, which run through, comes to 1914 and if this was distributed over 12 single unit trains, there should be no overcrowding.

Dealing with trains leaving Beach after 18-40, it will be noticed that alternating single and double units are run, but none is strengthened by an additional coach. Overcrowding is generally excessive on the Beach-Guindy section right up to E. 171 leaving at 20-09 after which there is practically no overcrowding. On the Guindy-Tambaram section, passengers sufficient to occupy a single unit train offer except for E. 157 leaving Beach at 18-56, where a double unit train or a less frequent interval will be justified.

312. Dealing with the problem as a whole, it is clear that the section Beach to Guindy requires double units with an additional coach, while the other section can be managed with Single unit trains. The frequency of trains requires to be increased and during the maximum rush hour, trains at 5′, or 6′, intervals are required to remove excessive overcrowding.

Tambaram–Chingleput Section

313. This is a single line metre gauge section, 19 miles in length with 5 intermediate stations. The distance between the stations varies from 1 to 5 miles. The section is considered as the outer suburban area of the metre gauge suburban section from Madras Beach to Tambaram. The area is fast developing on account of locations of industries in this area. Suburban season tickets are issued at suburban rates on this section.

This section is served mainly by three non-suburban trains each way which stop at intermediate stations and one shuttle train runs each way between Tambaram and Chingleput. The trains are hauled by steam locomotive with main line coaches.

314. In the Up direction, as per census taken on 28-11-55 (Monday) there is slight overcrowding on one train No. 646 Conjeevaram to Madras Beach arriving at Tambaram at 9-08 hours, the highest number of passengers being 508 while leaving Chingleput, the carrying capacity of the train being 440.

315. In the Down direction, there is slight overcrowding in train No. 637 when leaving Tambaram at 7-17 hours, the occupation being 440 as against the carrying capacity of 386. The overcrowding ceases at the next station, where the occupation comes down to 72. No. 1219 leaving Tambaram at 14-30 hours is overcrowded when leaving that station, the occupation being 359, as against the carrying capacity of 270. The overcrowding ceases at Guduvancheri station, a distance of 7 miles from Tambaram.

316. As there is hardly any overcrowding on this section worth mentioning, we have not attached the census charts. Local overcrowding can be minimised by increasing the carrying capacity of coaches and increasing the loads wherever necessary.

Broad Gauge

Suburban Sections

317. The Broad Gauge suburban service consists of three sections, as shown in *Annexure* 3

(i) Madras Central—Trivellore (North West Line)

(ii) Madras Central—Gummidipundi (North East Line).

(iii) Madras Central—Madras Beach.

318. *The Madras Central—Trivellore Section* of 26 miles has double line throughout with quadruple lines between Veyasarpaudy and Villivakkam. There are 13 stations inclusive of Madras Central and Trivellore. The distance between stations is 2 miles and less, except in three cases where it is 3½ to 4 miles. All trains are stopping trains generally and take about 1¼ hours for the run.

319. *The Madras Central—Gummidipundi Section* is 29 miles long and is double line from Madras Central to Tiruvottiyur and single line onwards to Gummidipundi. It has 12 stations inclusive of Madras Central and Gummidipundi. The distance between stations varies from ½ to 4 miles. All trains on this section are stopping trains and take about 1¾ hours on the run.

320. *The Madras Central—Madras Beach Section* is a short section with double line from Madras Central to Rayapuram and a single line from there to Madras Beach located in the Harbour area. The distance is 4¼ miles and there are five stations fairly close to each other. All trains on this section are stopping trains and take about 25 minutes.

321. The section between Madras Central and Basin Bridge is common to all the three suburban sections mentioned above. Except for the part of the Beach section beyond Basin Bridge, the suburban sections are all parts of the Main Lines on which suburban as well as through trains are run.

322. All the suburban sections are worked on the Absolute Block System with Sykes Lock and Block instruments on the double line and Neales or Theobald's token instruments on the single line. Most of the stations are mechanically signalled up to Standard III Semaphore lower Quadrant.

Composition of Suburban Trains

323. The entire suburban service on the broad gauge section is worked with steam traction. There are 13 rakes which work the entire suburban services on the broad gauge. These consist of 8 rakes of 8 bogies each, one rake of 7 bogies and two rakes of 5 bogies. In addition, two light rakes of 3 bogies each are provided between Rayapuram and Basin Bridge

stations. One independent rake of 12 bogies is also maintained exclusively for running Workmen trains, one each way, between Trivellore and Salt Cotaurs. This rake is considered unfit for use of public traffic.

324. Tank Engines which work these suburban trains are capable of hauling a maximum load of 9 bogies, but due to limited capacity of the platforms at Madras Central and Rayapuram, the rakes have been formed with only 8 bogies.

325. The 8 bogie rake is composed of 1 composite First, Second and Third, 5 Thirds and 2 Thirds with Guard and Luggage compartments. The 7 and 5 bogie rakes have one and three Thirds less, respectively, than the 8 bogie rake, and, therefore, have correspondingly less third class accommodation, the upper class accommodation remaining the same. The light rake is composed of 2 thirds and 1 third with Guard and Luggage compartments.

326. With the exception of the two light rakes of three bogies running between Rayapuram and Basin Bridge, all other rakes get interchanged and work on all the three sections with the result that the same quantum of traffic on different days may be carried by rakes of very different carrying capacities resulting in avoidable overcrowding. The maximum and minimum number of runs made by any one of these rakes is 10 and 4 respectively on any one day in a week, and provides sufficient time for maintenance purposes both at home and or at out-stations. No specially designed suburban coaching stock is available for use on the broad gauge; ordinary main line stock is used on the suburban services.

327. A separate compartment for ladies is reserved for Class III passengers on each of these rakes.

328. Toilet facilities are provided in almost all the coaches.

Frequency of Train Service

329. As will be seen from the Train Charts (*Annexures* 17 *&* 18)*, the total number of trains arriving at Madras Central from the direction of Trivellore, in a cycle of 24 hours, is 31, of which 8 are through trains and the total number leaving Madras Central is 29, of which 8 are through trains.

The Train Charts in *Annexures* 19 & 20*, will show that the total number of trains arriving at and leaving Madras Central, in a cycle of 24 hrs. is 11, of which 2 are through trains.

Passenger Traffic and Train Requirements

Madras Central–Trivellore Section

330. The census figures taken for a working day, Tuesday the 29th November 1955, on the Trivellore-Madras Central Section in respect of trains arriving at Madras Central between 7-30 hrs. and 11-00 hrs. are tabulated in the chart at *Annexure* 37*.

331. It will be observed from the chart that six trains arrive at Madras Central during this period. The carrying capacity of these trains vary from 665 to 840. These trains arrive at Madras Central at intervals of 58 minutes, 14 minutes, 25 minutes and the remaining two at intervals of 26 minutes.

332. There was overcrowding only in one train (which arrives at Madras Central at 9-20 hrs.) between Perambur and Madras Central, a distance of 3½ miles, the running time being 15 minutes. In the remaining trains, there was no overcrowding at all; in most cases, the trains were filled only upto half or one-third of the carrying capacities.

333. The corresponding census figures in respect of the trains starting from Madras Central in the evening commencing from 17-00 hrs. to 20-00 hrs. are extracted in chart at *Annexure* 38*.

334. There are six trains that leave Madras Central during this period at intervals of 30 minutes, 35 minutes, 30 minutes, 33 minutes and 29 minutes. The carrying capacity of the rakes used during this period vary from 404 to 840.

---

* Not Printed.

335. There are only two trains on which there was overcrowding *viz.*, trains leaving at 17·00 hrs. and 18·35 hrs. In the case of the first train, the overcrowding was upto Villivakkam . only four stations beyond Madras Central and in the case of the second train, it was only upto Perambur, the second station from Madras Central. The carrying capacities of these trains were 625 and 404 respectively. The highest number of passengers carried was 918 between Basin Bridge and Perambur *i.e.*, the next station.

336. No increase in the number of trains is called for. If all trains run with the full complement of 9 coaches and have their seating arrangement altered to meet the requirements of suburban travel, there would be sufficient room for standing passengers, and overcrowding will be eliminated.

Madras Central—Gummidipundi Section

337. On the Madras Central—Gummidipundi section, the census figures taken for a working day, Wednesday the 7th December 1955, in respect of trains arriving at Madras Central commencing from 7-30 hours to 11-00 hours are shown in the chart at *Annexure* 39*.

338. There are only 3 trains that are scheduled to arrive Madras Central between these hours at 7-50 hrs., 9-05 hrs. and 9-40 hrs. the interval between the first and second train being 75 minutes and between the second and third train 35 minutes.

339. There was overcrowding only on two trains that arrived Madras Central at 7-50 and 9-40 hrs. In the case of the first train, the overcrowding was between Attipattu and Tiruvottiyur, a distance of 7¾ miles, the running time being 18½ minutes. In the case of the second train, the overcrowding was between Ennore and Basin Bridge, a distance of 7¾ miles, the running time being 35 minutes. Their carrying capacities were 464 and 692. The highest number of passengers carried by anyone of these trains was 820.

340. As for the reverse direction *i.e.*, for trains starting from Madras Central to Gummidipundi in the evening commencing from 17-00 hrs. to 20-00 hrs. these are extracted in the chart at *Annexure* 40*.

341. There are 3 trains which leave Madras Central at 17-45 hrs. 18-55 hrs., and 19-15 hrs. respectively, the interval between the first and second train being 1 hour and 10 minutes and between the second and third train being 20 minutes. Their carrying capacities were 640, 730 and 777 respectively.

342. There was overcrowding only in one train that left Madras Central at 17-45 hrs. from Basin Bridge upto Attipattu, a distance of 11½ milles, the running time being 33 minutes. There was no overcrowding on the other trains. In the case of the last train, it was filled only upto one-fourth of its carrying capacity. The highest number of passengers carried by anyone of these trains was 774.

343. There was a little overcrowding on some trains and this overcrowding could be overcome by providing more standing room in the trains as well as by increasing the number of coaches in the rakes as, at present, rakes are not formed to the full hauling capacity of the tank engines.

---

* Not Printed.

6—1 D. T. (Rly. Bd.) 56.

CHAPTER IV

CALCUTTA SUBURBAN RAILWAY SYSTEM

Calcutta Terminals

401. The Suburban areas of Calcutta spread round the city in all directions but are divided into two distinct territories by the river Hooghly which cuts across it. The Hooghly is bridged by a road bridge between Calcutta proper and Howrah, a combined Rail and Road bridge on the Calcutta Chord Railway between Dankuni and Dum Dum and a Railway bridge between Bandel and Naihati at the farthest end. The last is, incidentally, the oldest railway link between the railways of the country and the docks which, before the construction of the Calcutta Chord Railway, carried all the dock traffic now diverted to the latter link.

402. The suburban railway sections serving Calcutta are indicated in the map (*Annexure* 4). It will be seen that Calcutta is served by two terminals, Sealdah and Howrah. Sealdah has three stations called:

(a) Sealdah South,
(b) Sealdah North, and
(c) Sealdah Main,

for dealing with the trains on the different sections north and south of Sealdah while Howrah with a single station building and a single yard, deals with the trains running on the various sections of the Eastern as well as the South Eastern Railway. The Howrah passenger yard is divided into two sections, the North section dealing with Eastern Railway trains and the South section dealing with both South Eastern Railway and Eastern Railway trains. These two sections are by the side of each other with a cab road in between.

SUBURBAN SYSTEM—SOUTH OF SEALDAH

Suburban Sections

403. Apart from a separate station building, Sealdah South has an entirely independent yard for the reception and despatch of trains from and to the southern sections, with its own exclusive stabling yard and loco shed; and, for all working purposes, it is an independent station located in close proximity of the other stations of Sealdah. It caters for the entire traffic of the section Sealdah-Baruipur with branches taking off at—

(*a*) Ballygunge (Mile 3¼) for Budge Budge (Total distance from Sealdah—16 miles),
(*b*) Sonarpur (Mile 10) for Canning (Total distance from Sealdah—28 miles),
(*c*) Baruipur (Mile 15½) for Diamond Harbour (Total distance from Sealdah—36¾ miles), and
(*d*) Baruipur (Mile 15½) for Lakshmikantapur (Total distance from Sealdah—38¼ miles).

Annexure 5 embodies a line diagram of the suburban sections south of Sealdah. The absolute Block System with semaphore signals is in use on all the suburban sections except (*i*) between Sealdah and Jadabpur (Sealdah-Baruipur section) and (*ii*) Sealdah-Majherat (Budge Budge section) where the Automatic Block System with colour light signals is in use. Sealdah (South) station itself is equipped with semaphore signals and mechanically worked points.

Sealdah—Baruipur Section

404. The section Sealdah-Baruipur is 15½ miles of double line, except over the Garia Bridge (Mile 7½) where the tracks are gauntletted and, consequently, the capacity of the section is limited. The gauntletting has imposed a 10 mile speed restriction over the bridge which is situated on the Sealdah-Sonarpur section whose maximum speed is even otherwise limited to 45 miles per hour, though the maximum speed between Sonarpur and Baruipur is 60 miles per hour and the track is 90 lbs. all along. The Eastern Railway were unable to explain the reasons for this difference in maximum speed and advised the Committee in the following terms :—

> "As old papers of B.A. Railway regarding Sealdah Division are not available in this office, most of them having gone to Pakistan during the partition of Railways, 1947, it is difficult for us to give the correct reasons for the discrepancy pointed out by the Chairman, Suburban Train Overcrowding Enquiry Committee. However, we are looking into the proposal of raising the speed between Sonarpur-Calcutta from 45 miles per hour to 60 miles per hour."

There are 9 stations on this section, inclusive of Sealdah and Baruipur, spaced from ½ mile to 3¼ miles apart. Of these, 2 are flag stations. The longest block section is 3¼ miles, between Subhashgram and Baruipur, the flag station Mallikpur, in between, being 2 miles from Baruipur and 1¼ miles from Subashgram. The overall journey time for trains is of the order of 1 hour for the distance of 15½ miles.

Apart from 16 trains, each way, on the Budge Budge branch, there are 23 trains, each way, on this section, 4 to and from Baruipur, whilst the rest run to and from either Diamond Harbour or Lakshmikantapur branch. The train service between Sealdah and Sonarpur is 34, each way.

Budge Budge Branch

405. The Budge Budge Branch taking off at Ballygunge is 12¾ miles long and, except for a length of 4 miles of double line between Ballygunge and Majherat, is a single line, with stations 1 to 2¾ miles apart. The maximum permissible speed over the branch is limited to 45 miles per hour, except between Ballygunge and Majherat where it is 60 miles per hour. There are 8 stations on this branch, inclusive of Ballygunge and Budge Budge. Of these 8 stations, 2 are flag stations. The longest block section is 3¼ miles, between Majherat and Santoshpur. The overall journey time of trains between Sealdah and Budge Budge, a distance of 16 miles, is of the order of 1 hour.

There are 16 up and 16 Down trains, running at about an hour's interval, to and from Sealdah, per day, there being no passenger train service during the late hours of night.

Canning Branch

406. The Canning Branch takes off at Sonarpur (Mile 10) and it is a single line section of 18 miles with stations 1¼ miles to 4½ miles apart, the maximum permissible speed being 40 miles per hour and the overall journey time being of the order of 1¾ hours for the total distance of 28 miles between Sealdah and Canning. There are 7 stations on this branch, inclusive of Sonarpur and Canning. Of these 7 stations, 2 are non-block stations. The longest block section is 5 miles, between Sonarpur and Champahati.

There are 11 Up and 11 Down trains, per day, running to and from Sealdah, there being no passenger train service during the late hours of night.

Diamond Harbour Branch

407. The Diamond Harbour Branch, taking off at Baruipur, is a single line and is 21¼ miles long, the total distance from Sealdah being 36¾ miles. The stations are 1¼ to 3½ miles apart, the maximum permissible speed being 45 miles per hour. The overall journey time of trains is of the order of 2¼ hours for the total distance of 36¾ miles. There are 10 stations on this branch. inclusive of Baruipur and Diamond Harbour. Of these 10 stations, 4 are flag stations. The longest block section is 6¼ miles, between Mograhat and Deula.

On this section, there are 10 Up and 10 Down trains, running to and from Sealdah.

Lakshmikantapur Branch

408. The Lakshmikantapur Branch, taking off at Baruipur, is single line and 22¾ miles long, the total distance from Sealdah being 38¼ miles. The stations are 1¼ to 5 miles apart, the maximum permissible speed being 40 miles per hour and the overall journey time of trains being of the order of 2¼ hours for the total distance of 38¼ miles. There are 10 stations on this branch, inclusive of Baruipur and Lakshmikantapur. Of these 10 stations, 5 are non-block stations. The longest block section is 7½ miles, between Jayanagar Majilpur and Lakshmikantapur.

The trains on this section are 9 Up and 9 Down, all running to and from Sealdah.

Composition of suburban trains

409. The suburban trains are composed of steam line coaching stock. In order to avoid turning of engine and to secure quicker acceleration and deceleration, the suburban train

are, as a general rule, worked by tank engines, whose maximum load is determined by the Railway to be 8 bogies. The Eastern Railway have stated that the total number of tank engines available on the Sealdah Division consists of—

WM Class	22
BTC Class	30
STS Class	17

and that this number is not adequate. The prescribed normal composition of the trains on all the sections south of Sealdah, except the Sealdah-Budge Budge section, is 8 bogies. The prescribed normal composition of the trains on the Sealdah-Budge Budge section is 6 bogies. All the classes of accommodation *viz.*, I, II and III are offered in the suburban trains; also, separate compartments are reserved for women in the III class and in the II class. In view of the fact that there is considerable volume of produce carried by the suburban trains outside office peak hours, the normal composition of trains is as under—

All sections, except the Sealdah-Budge Budge section—

2 Four Wheeler Produce Vans equalling one bogie, 2 Bogies Third Class with Guard and Luggage Compartment, 1 Bogie composite with Third and Upper Class (Both First and Second) and 4 Bogies Third Class.	Total 8 bogies.

Sealdah-Budge Budge section—

2 Four Wheeler Produce Vans equalling one bogie, 1 Bogie composite with Third and Upper Class (Both First and Second) and Guard's compartment, and 4 Bogies Third Class.	Total 6 bogies.

The average proportion between the First, Second and Third class accommodation in the suburban trains is 1 : 5 : 38. The carriages used on suburban trains are of varying types, some meant for suburban traffic whilst others are just old stock of the main line. The Eastern Railway have stated—

> "Special type of coaches subject to their availability are provided on the suburban trains. These have the following special features.
>
> (*i*) Wide sliding doors,
>
> (*ii*) Short space outward opening doors,
>
> (*iii*) Lighter tare weight.
>
> 293 coaches of the types mentioned above are available on this system at present. This number is not, however, adequate and therefore, certain suburban rakes are composed of standard coaches.

The Eastern Railway have also stated that the existing number of coaches available for suburban trains (both special suburban type and ordinary put together) are sufficient for the existing suburban services only and adequte resources are not available for the introduction of additional services and that no more suburban type coaches are being built in view of the suburban area electrification scheme. Some carriages of the old main line stock are of the compartment type, whilst others are without compartments. Some carriage have lavatories whilst others have none, the number of lavatories in the compartment type carriages being generally greater, as each compartment is invariably provided with a lavatory. The rakes of suburban trains traversing a distance of 50 miles and above are generally provided with lavatories. The space available for standing is exceedingly small and when more passengers, than the seats can hold, have to travel, the excess passengers have either to stand between the knees of passengers seated on opposite benches inside the carriage or on the foot-boards outside the carriage. Although, during the rush hours, the suburban trains, commonly called as office specials, do not carry vendors or their produce, there being a specific restriction in this respect, no change is made in the composition of the rake and the trains run with the two four wheeler produce vans during the rush hours as well. The vans are available for use of such passengers as care to get into them. These vans are converted motor vans or horse boxes or old four wheeler coaches, with elaborate rack arrangement and little light except at the door ways.

17 rakes of 8 bogies each are employed for working the suburban trains on the suburbans sections south of Sealdah—3 for the trains on the Sealdah-Budge Budge section and 14 for the trains in the others. The details of the rake links are given on pages XIX and XX at the end of the Sealdah Division Working Time Table.

Frequency of Train Service

410. It will be seen from the Train Charts (*Annexures* 21 & 22*) that Sealdah South receive 50 trains per day and despatches an equal number per day. No train arrives or leaves during the late hours at night. The number of trains for the different sections is as follows :—

Budge Budge	16	
Canning	11	(one stops short at Champahati.)
Lakshmikantapur	9	
Diamond Harbour	10	
Baruipur	4	
	50	

The Diamond Harbour and Lakshmikantapur trains all pass through Baruipur Junction which deals with 23 trains in each direction every day.

The number of trains arriving at and leaving Sealdah South during the morning and evening rush periods is detailed below :—

	Morning			*Evening*			
	8 *hrs. to* 9 *hrs.*	9 *hrs. to* 10 *hrs.*	10 *hrs. to* 11 *hrs.*	16 *hrs. to* 17 *hrs.*	17 *hrs. to* 18 *hrs.*	18 *hrs. to* 19 *hrs.*	19 *hrs. to* 20 *hrs.*
Arrivals	3	7	4	2	3	3	3
Departures	1	3	3	3	4	4	3
TOTAL	4	10	7	5	7	7	6

For 4 platform lines which Sealdah South has, it cannot be stated that it cannot deal with a larger number of trains and our inspection along with the Divisional Transportation Superintendent and Signal and Tele-communication Engineer confirmed this impression.

Passenger Traffic and Train Requirements

411. In their memorandum submitted to the Committee, the Eastern Railway have stated as under :—

> "This Railway administration considers the morning peak period to be between 8-20 and 10-35 hours and the evening peak period between 16-30 and 19-15 hours. This applies both to Howrah and Sealdah stations. The Committee appointed to investigate the possibilites of running passenger train services over the Port Commissioners Railway in Calcutta, commonly known as the Circular Railway Committee, considered the peak period to be between 8-30 and 10-30 a.m. in the morning (*vide* page 12 of their Report). That Committee did not specify what they considered to be the evening peak period. The Calcutta Terminal Facilities Committee which submitted its report to the Government in 1947, took a more restricted view of the peak or rush periods [*vide* paragraph 81 (*b*) of their Report], as would be seen from the extract reproduced below :—
>
> "Another factor which is responsible for the congestion at the terminals, the overcrowding in trains and the inconvenience to which the passengers are exposed, is the concentration of large collections of people arriving or departing during a very short period of the morning or afternoon. This is known as the rush or peak period. It is immaterial whether the travelling public, the Railways or the business office hours determine the length of this period. The fact remains that this period is restricted to about one hour each in the morning and evening, both at Howrah and Sealdah".

---

*Not Printed.

Sealdah-Baruipur section

412. The census figures taken for a working day (Wednesday, the 14th December, 1955) between Baruipur and Sealdah in respect of the trains arriving at Sealdah between 8 hours and 11 hours in the morning from the various direction, except Budge Budge are extracted in the chart (*Annexure* 41*). The census figures in respect of these trains for the branch line portions have not been reproduced, for the sake of brevity, but they are available in the original records. There are 11 trains arriving at Sealdah during the period—

3 of which are from Canning,
3 of which are from Lakshmikantapur,
3 of which are from Diamond Harbour, and
2 of which are from Baruipur.

The carrying capacity of these trains varies from 714 to 1062, depending on the types of carriages on the particular rake working the train.

The number of passengers on the trains, in their initial stages, is far below the carrying capacity and in only 1 out of the 9 cases, *i.e.*, Train No. S. 287, has a train been filled to capacity when *arriving* at Baruipur. The majority of the trains get overcrowded at or by the time they reach Jadabpur and the section with the densest occupation is between Jadabpur and Sealdah a distance of about 5 miles covered in about 17 to 25 minutes. The five trains that are, comparatively speaking, heavily overcrowded on the Jadabpur-Sealdah section are Nos. S. 287, S. 245, S. 267, S. 363 and S. 289. The total of the maximum number of passengers on each of these five trains at any point on the run comes to 6,533 or an average of 1,300 per train. The maximum number on any one train at any one time is 1,468.

If the seating arrangement of stock is altered to provide seating and standing accommodation and rakes capable of accommodating about 1,200 passengers per train are utilised, six trains instead of the existing five ought to carry the present traffic without excessive overcrowding. This additional train need run between Sealdah and Baruipur or a station short of it. To ensure even distribution and prevent excessive concentration on particular trains, a few stops of certain trains may have to be eliminated whereby those trains will run through some station.

413. The corresponding census figures in respect of the trains in the reverse direction *i.e.*, trains leaving Sealdah in the evening, between 16-15 hours and 19-30 hours, for the various directions, except Budge Budge are extracted in the chart (*Annexure* 42*). There are 9 trains leaving Sealdah during the period and their carrying capacity ranges between 745 and 1024, for reasons explained before. The number of passengers at the starting station or, rather, when the trains leave Ballygunge varies generally from above 1,000 to 1,727 but decreases appreciably by the time the train passes Jadabpur. The overcrowding ceases within a few stations from Jadabpur. The total of the maximum number of passengers on each of the nine trains at any point on the run comes to 11,096 or an average of 1,233 per train. The maximum number of any one train at any one time is 1,727.

An extra train introduced in the evening rush period at about 17-30 between Sealdah and Baruipur or a station short of it along with measures suggested for the reverse direction is calculated to bring down the excessive overcrowding to within reasonable limits.

Sealdah-Budge Budge section

414. The census figures taken on a working day (Wednesday, the 14th December, 1955) on the Budge Budge-Sealdah section , in respect of the trains arriving at Sealdah from Budge Budge in the morning up till 11 hours and in the evening between 16-15 hours and 19-30 hours are tabulated in the Chart (*Annexure* 43*). Five trains arrive at Sealdah in the morning up till 11 hours (Train No. S. 207 having been included, as its arrival at Sealdah is only 5 minutes past 11 hours). While there is no overcrowding by any of these trains, it will be seen that a good number move to and alight at Brace Bridge and Majherat stations, especially by the first, third and fourth trains *viz.*, S. 199, S. 203 and S. 205. Four trains arrive at Sealdah between 16-15 hours and 19-30 hours. (Trains Nos. S. 215 and S. 221 having been included as they arrive at Sealdah at 16-09 hours (only 6 minutes before 16-15 hours) and 19-32 hours (only two minutes after 19-30 hours) respectively. While there is no overcrowding by any of these trains, it will be seen that several passengers board these trains at Brace Bridge and move in the direction of Sealdah, especially by trains Nos. S. 215, S. 217 and S. 219.

---

* Not Printed.

415. The corresponding census figures for the reverse direction *i.e.*, in respect of trains leaving Sealdah upto 11 hours in the morning and between 16-15 hours and 19-30 hours in the evening are embodied in the chart (*Annexure* 44*). There are 6 trains leaving Sealdah in the morning up till 11 hours. Only one train *viz.*, S. 208 (carrying capacity-782) leaving Sealdah at 9-33 hours is overcrowded even when leaving Sealdah and the overcrowding ceases at Brace Bridge where as many as 642 passengers for the Dock area and the South Eastern Railway Headquarters Office alight. It will also be seen that a good number of passengers alight at Brace Bridge by the three previous trains, *viz.*, S. 202 leaving Sealdah 6-20 hours, S. 204 leaving Sealdah at 7-25 hours and S.206 leaving Sealdah at 8-30 hours. Three trains leave Sealdah in the evening between 16-15 hours and 19-30 hours. While none of the trains get overcrowded anywhere, it will be seen that a good number of passengers alight at Santoshpur and beyond.

416. The two charts will show that the pattern of traffic on this section is different and this is apparently due to the fact that there is movement in the morning in the direction of Budge Budge to the Dock areas served by the Budge Budge branch and movement in the evening is in the direction of Sealdah, from the Dock areas.

The overcrowding on trains can be considerably reduced by the increase in carrying capacity of trains and adjustment of timings of trains No. S. 208 and S. 210 leaving at 9-33 and 10-35 respectively so that the later train shares a part of the traffic carried by the earlier train. The 10-35 train is poorly filled and could with advantage be run to earlier timings, both rake and engine being available in Sealdah.

SUBURBAN SYSTEM—NORTH OF SEALDAH

Suburban Sections

417. Sealdah (North) and Sealdah (Main) stations deal with the traffic to and from the sections north of Sealdah. The "Main" station largely deals with through trains while the 'North' station is used for dealing with the suburban trains. Although the station buildings of the two stations are separate, the yards of the two stations are really the two wings of a single yard, with a single loco shed and a single set of stabling sidings. The two stations are complementary parts of a single unit. Both the stations have 4 platform lines each, which are signalled for the reception and despatch of trains, except platform line No. 5, which is signalled for the despatch of trains only. The Committee could find no cogent reason for platform line No. 5 not being signalled for the reception of trains, especially when the station is dealing with a large number of trains, per day.

There is an extra double line between Sealdah and Naihati a distance of 23½ miles, called the "Quad Lines". This double line is, at present, used for goods trains only and is not connected with the passenger yard at Sealdah station but could be easily linked with it.

Annexure 6 embodies a line diagram of the suburban sections north of Sealdah. Important particulars of the sections served by Sealdah (North) and (Main) stations are given in the following chart :—

	Section					
	Sealdah-Ranaghat †	Ranaghat-Bogoola	Dum Dum Bongaon	Ranaghat-Krishnagar City	Santipur Branch	Ranaghat-Bongaon
Single Line or Double Line . .	Double	Double	Single	Single	Single	Single
Length in Miles	45½	12¼	43¼	16¼	9¾	20¾
Maximum permissible speed in miles per hour. .	60	60	45	40	40	35
Number of intermediate stations . .	20	1	14	4	2	3
Distances between stations	1 to 3¾	5½ to 6¾	1¼ to 6½	1¾ to 6¼	2¼ to 4½	3 to 6½
Number of Block sections . . .	19	2	9	4	1	2
Maximum length of block sections .	3¾ miles	6¾ miles	8 miles	6¼ miles	9¾ miles	11½ miles

---

* Not Printed

	Section					
	Sealdah-Ranaghat †	Ranaghat-Bogoola	Dum Dum-Bongaon	Ranaghat-Krishnagar City	Santipur Branch	Ranaghat-Bongaon
Approximate Running time over section (In minutes).	135″	25″	135″	45″	30″	55″
Overall distance from Sealdah to farthest end of section in miles.	45½	57¾	47½	61¾	57¾	..
Approximate Running time from Sealdah to end of section (In hours).	2¼ hours	2¾ hours	2½ hours	3 hours	3 hours	..
Number of trains each way, per day over section.	45	7‡	14	10	9	6
Number of trains, each way, per day running to and from Sealdah.	45	6	14	9	6	..

†There is an extra double line between Sealdah and Naihati called the Quad lines for the running of goods trains.

‡One of the six trains does not stop at Bogoola.

The Absolute Block System with semaphore signals is in use on all the suburban sections served by Sealdah (North) and (Main) stations except that the Automatic Block System with colour light signals is in use between Sealdah and Dum-Dum and partially between Dum Dum and Agarpara. The points at Sealdah (North) and (Main) stations are worked mechanically and the stations are equipped with semaphore signals. Paper Line Clear Tickets are in use on the Santipur Branch.

Bandel-Naihati link

418. This double line link, 5¾ miles long, crosses the Hooghly, by the Jubilee Bridge (about 2,000 feet long) over which the double line tracks are interlaced, and connects Bandel on the Howrah-Burdwan Main Line with Naihati on the Sealdah-Ranaghat line. The maximum permissible speed on the link is 25 miles per hour, subject to a permanent speed restriction of 10 miles per hour for two miles, inclusive of the Jubilee Bridge. Double heading is prohibited on the bridge. There are four stations on the link, inclusive of Bandel and Naihati, the stations being spaced from about 1 mile to 2¾ mile apart. Of the 2 stations in between Naihati and Bandel, 1 is a flag station; and, the longest block section is 3 miles between Naihati and Hooghly Ghat. The overall journey time of trains between Bandel and Naihati is about half an hour, for the distance of 5¾ miles.

The Absolute Block system, with colour light signals is in use on the link.

There are 14 trains, each way, per day, on the Bandel-Naihati link, of which one is the Gaya-Sealdah Passenger and the remaining 13 are shuttle trains between Bandel and Naihati.

Dankuni-Dum Dum link

419. This link, commonly called the "C.C" or "Calutta Chord" Railway is also double line and is 9¼ miles in length. It connects Dankuni on the Howrah-Burdwan Chord with Dum Dum on the Sealdah-Ranaghat line, crossing the Hooghly by the Willingdon Bridge. The maximum permissible speed is 30 miles per hour. There are five stations on the link, inclusive of Dankuni and Dum Dum, the distance between stations varying from about 1 to 3 miles. Of the 3 stations in between Dankuni and Dum Dum, 2 are flag stations; and, the longest block section is about 6½ miles, between Barnagar Road and Dankuni. The journey time of trains between Dankuni and Sealdah is of the order of one hour, for the total distance of 13½ miles.

The passenger train service on the link consists of 13 trains, each way, of which 3 are Express trains, 1 is a train between Burdwan and Sealdah and 1 between Howrah, and Sealdah. The remaining 8 are trains between Dankuni and Sealdah.

Composition of Suburban Trains

420. The normal composition of the rakes is as follows :—

2 Four wheeler Produce Vans equalling one bogie
2 Bogies Third Class with Guard Compartment
1 Bogie composite with Third and Upper Class (both 1st and 2nd), and
4 Bogies Third Class . . . . —Total 8 bogies.

The execptions to this are (*i*) two trains between Sealdah and Santipur, (*ii*) two between Sealdah and Krishnagar City, (*iii*) all between Bandel and Naihati and (*iv*) all between Sealdah and Dankuni. The first two are run with 10 bogies and the others with 6 bogies each.

Frequency of Train Service

421. It will be seen from the Train Charts (*Annexures* 23 *&* 24*) that Sealdah North receives 72 trains and despatches an equal number per day.

The number of trains arriving at and leaving Sealdah North during the morning and evening rush periods are detailed below :—

	Morning			*Evening*			
	8 *hrs. to* 9 *hrs.*	9 *hrs. to* 10 *hrs.*	10 *hrs. to* 11 *hrs.*	16 *hrs. to* 17 *hrs.*	17 *hrs. to* 18 *hrs.*	18 *hrs.* to 19 *hrs.*	19 *hrs. to* 20 *hrs.*
Arrivals	5	9	4	4	4	4	4
Departures	2	5	5	4	8	5	4
TOTAL .	7	14	9	8	12	9	8

These trains are dealt with on the 4 platform lines of the Sealdah "North" station and the 4 platform lines of the Sealdah "Main" station.

Passenger Traffic and Train Requirements

Sealdah-Ranaghat Section

422. The census figures taken for a working day (Monday, the 19th December, 1955) on the Sealdah-Ranaghat section in respect of the local trains arriving at Sealdah between 8 hours and 11 hours, are tabulated in the chart (*Annexure* 45*). The census figures for the journeys of these trains up till Ranaghat have also been taken but they have not been reproduced for the sake of brevity, but they are, however, available in the original records. There are 10 local trains arriving at Sealdah during the period.

2 of which are from Krishnagar City,
2 of which are from Santipur,
1 of which is from Bogoola (Banpur),
1 of which is from Kalyani,
2 of which are from Kanchrapara, and
2 of which are from Naihati.

The carrying capacities of these trains on the date of census *viz.*, 19th December 1955 varies from 471 to 990 as will be seen from the table below and the normal composition of these trains are as follows :—

Serial No.	Train No.	From Station	Normal Composition in bogies	Carrying capacity
1	S. 378	Santipur	8	613
2	S. 338	Kanchrapara	8	990

---

* Not Printed.

Serial No.	Train No.	From Station	Normal Composition in bogies	Carrying capacity
3	S. 374	Krishnagar City	8	919
4	S. 392	Bogoola	8	542
5	S. 372.	Krishnagar City	10	865
6	S. 350	Kalyani	8	855
7	S. 386	Santipur	10	791
8	S. 328	Naihati	8	471
9	S. 330	Naihati	8	511
10	S. 340	Kanchrapara	8	632

It will be seen from the census figures that, of the 5 trains arriving at Ranaghat *viz.*, S. 378 from Santipur, S. 374 from Krishnagar City, S. 392 from Bogoola, S. 372 from Krishnagar City and S. 386 from Santipur, not even one is filled to capacity when arriving at Ranaghat. In fact, in the case of 4 of the 5 trains *viz.*, Trains Nos. S. 378, S. 374, S. 392 and S. 386, the occupation on arrival at Ranaghat is not even half the carrying capacity of the train. Secondly, of the total of 10 trains arriving at Sealdah during the period, there is no overcrowding on one train *viz.*, S. 338. Of the remaining 9 trains, all of them except one *viz.*, train No. S. 350 get overcrowded at some station between Kanchrapara and Tittaghur. Train No. S. 350 gets overcrowed at Agarpara, beyond Tittaghur. Thirdly, the portion where generally the occupation of trains is densest is between Agarpara and Sealdah, a distance of 8½ miles, covered in 26 to 34 minutes. The total of the maximum number of passengers on each of the nine overcrowded trains at any point on the run comes to 11,738 or an average of 1,304 per train. The maximum number on any one train at any one time is 1,492.

The overcrowding on trains can be considerably reduced by the increase of the carrying capacity of trains to about 1,200. This, in the case of two trains arriving Sealdah at 9-45 and 12-10, is as low as 471 and 511 respectively.

The local from Kanchrapara arriving Sealdah at 8-22 is not well patronized and could with advantage be retimed to arrive later to relieve the Krishnagar city train which if run through some stations would not be so heavily loaded between Kanchrapara and Sealdah

An additional train from Tittaghur arriving Sealdah at about 10 hours would help to relieve overcrowding on this section.

The effect of the above changes would be that the 11,738 passengers now carried by 9 trains will be spread on 11 trains of much larger carrying capacity.

423. The corresponding census figures in respect of the local trains starting from Sealdah in the evening between 16-15 hours and 19-30 hours are extracted in the chart (*Annexure* 46*). There are 10 local trains leaving Sealdah, during the period, their carrying capacity varying from 524 to 969. As already explained this wide variation in carrying capacity is due to the wide difference in the types of carriages used on suburban trains. Of these 10 trains, two are for Krishnagar City, two for Santipur, one for Bogoola (Banpur), one for Kanchrapara, one for Kalyani, two for Naihati and one for Tittaghur. It will be observed from the census figures that all the trains get overcrowded at Sealdah itself, except one train *viz.*, S. 343 leaving Sealdah at 16-25 hours which gets overcrowded at Ultadanga Road, the next station. Only on 3 out of the 10 trains, there is overcrowding beyond Barrackpore. There is no overcrowding beyond Naihati, except in the case of one train and even this train becomes normal at the next stopping station *viz.*, Kanchrapara. The census figures also show that the portion where the occupation of trains is densest is between Sealdah and Agarpara. The total of the maximum number of passengers on each of these ten trains at any point on the run comes to 12,474 or an average of 1,247 per train. The maximum number on any one train at any one time is 1,598.

The overcrowding on the Krishnagar city train leaving Sealdah at 18-04 is largely due to Barrackpore passengers crowding this train instead of the Naihati local which leaves Sealdah at 17-55 and reaches Barrackpore later. This Naihati local ought to be so timed that after skipping over certain stations after Dum Dum Jn., it reaches Barrackpore before the Krishnagar city train. Further, the Naihati local leaving at 17-40 need run up to Barrackpore only. An additional train up to Barrackpore leaving Sealdah touching the timings of 17-05 and 17-28 ought to ease overcrowding. The introduction of the additional train on the section will mean that 12,474 passengers now carried by 10 trains will be distributed over 11 trains with their carrying capacities increased as recommended by us.

---

* Not Printed.

Sealdah -Bongaon Section

424. The census figures taken on a working day *viz.*, Wednesday, the 14th December 1955, on the Sealdah-Bongaon section in respect of the local trains arriving at Sealdah between 8 hours and 11 hours, in the morning, are extracted in the chart (*Annexure* 47*). There are 4 trains during the period, all from Bongaon, their carrying capacity varying from 537 to 908. The census figures indicate that overcrowding starts generally on the Habra-Hridaipur section and becomes pronounced from Madhyamgram, the section between Madhyamgram and Sealdah being the section where all the trains are overcrowded and the train occupation is most dense. The distance from Madhyamgram to Sealdah is 11 miles and the overall journey time varies from 34 to 43 minutes. The total of the maximum number of passengers on each of these four trains at any point on the run comes to 6,259 or an average of 1,565 per train. The maximum number on any one train at any one time is 1,802.

The overcrowding is very marked on this section between Madhyamgram and Sealdah mainly due to very low carrying capacity of these trains : the census chart justifies running of an additional train between Madhyamgram and Sealdah between the hours 9-25 and 10-00 which would mean that 6,259 passengers now being carried by four trains to Sealdah will be carried by five trains.

425. The corresponding census figures in respect of the local trains leaving Sealdah in the evening, between 16-15 hours and 19-30 hours, are extracted in the chart (*Annexure* 48*). There are 4 trains leaving Sealdah, all for Bongaon, during the period, their carrying capacity varying from 795 and 966. All the trains are overcrowded when leaving Sealdah. Except in the case of 1 train, the overcrowding ceases at Baraset, the next station after Hridaipur. The single train which leaves Baraset overcrowded becomes normal at the next station. The section where all the trains are overcrowded and the occupation is most dense is between Sealdah and Madhyamgram. The total of the maximum number of passengers on each of these four trains at any point on the run comes to 7,052 or an average of 1,763 per train. The maximum number on any one train at any one time is 1,822.

Similar remarks as stated for the down direction apply in the case of passenger traffic proceeding from Sealdah towards Bongaon. On this section overcrowding is noticeable upto Hridaipur a station ahead of Madhyamgram. The carrying capacities of trains are low. The study of the chart indicates that two additional trains need to be run between Sealdah and Madhyamgram to carry away the excess. 7052 passengers are now carried by 4 trains for which six are necessary.

Sealdah-Dankuni Section

426. The census figures taken on a working day *viz.*, 3rd January 1956 (Tuesday), in respect of the local trains on the Sealdah-Dankuni section, arriving at Sealdah, between 8 and 11 hours in the morning are extracted in the chart (*Annexure* 49*). There are 3 trains during the period, two from Dankuni and one from Howrah, the carrying capacity of these trains varying from 417 to 703. Only one gets overcrowded on arrival at Dum Dum and that too only by 72 passengers as the carrying capacity of the train was 417.

427. The corresponding census figures for the reverse direction, *i.e.* for local trains leaving Sealdah in the evening between 16-30 hours and 19-30 hours are shown in the chart (*Annexure* 50*). There are 2 trains during the period and their carrying capacities are 502 and 703. Only one train *viz.*, S. 191 with the lower carrying capacity of 502 is overcrowded and has 615 passengers when leaving Sealdah. The overcrowding ceases at the next halt of the train.

---

* Not Printed.

428. A study of the subjoined statement showing the number of passengers on the trains from the directions of Naihati, Dankuni and Bongaon, when arriving at Dum Dum and on arrival at Sealdah, during the morning rush hours, is revealing :—

Train No.	From or *via*	Number of passengers on train when arriving Dum Dum	Number of passengers on train on arrival at Sealdah	Time of arrival at Sealdah,
				Hrs.
S. 184	Dankuni	311	393	8-46
S. 374	Naihati	1358	1436	8-55
S. 306	Bongaon	1356	1502	9-02
S. 392	Naihati	984	1081	9-19
S. 186	Dankuni	364	434	9-10
† S. 372	Naihati	1344	1344	9-20
	† (Train runs through Dum Dum)			
S. 308	Bongaon	1711	1665	9-25
S. 350	Naihati	1140	1241	9-32
† S. 386	Naihati	1492	1492	9-40
	† (Train runs through Dum Dum)			
S. 328	Naihati	1180	1446	9-45
S. 188	Dankuni	413	489	9-50
S. 310	Bongaon	1653	1766	10-00
S. 330	Naihati	1294	1401	10-10
Total 13 trains.			15690	
Average Number of Passengers per train				1,207.

Of the 13 trains, 3 are from Dankuni, 3 from Bongaon and 7 from and *via* Naihati. The average number of passengers arriving at Sealdeh per train by the trains from each of the three directions compare as under :—

	From Dankuni	From or *via* Naihati	From Bongaon
Average number of passenger per train arriving at Sealdah	439	1,349	1,644

429. In view of the fact that the terminal facilities at Sealdah limit the number of trains that can be run to ease overcrowding, bringing in trains with small number of passengers from Dankuni section into Sealdah is unjustified. If these trains are terminated at Dum Dum and passengers tranship on the same lines as the Bandel Naihati passengers do at Naihati, on an average 363 passengers per train will have to change train which should not be difficult when more trains get introduced on the Dum Dum Sealdah section. As for passengers proceeding towards Dankuni, changing at Dum Dum will cause no difficulty as they will be changing on to an originating train. With the termination of these trains at Dum Dum, their paths can be utilized for running additional trains from the other two directions where the overcrowding calls for immediate remedy.

Naihati-Bandel Section

430. The census figures taken for a working day *viz*., 28th December 1955 (Wednesday) in respect of the local trains on the Naihati-Bandel section show that there is practically no overcrowding on this section. The census figures have not been reproduced but they are available in the original records.

---

* Not Printed.

431. Of the 13 trains from Naihati to Bandel, only 1 is overcrowded and that is the train leaving Naihati at 9.12 hours, the carrying capacity being 439. The train gets overcrowded at Garifa, the next station after Naihati, the number of passengers when leaving Garifa being 482. The overcrowding increases at Hooghly Ghat to 580 and continues upto Bandel. The distance between Garifa and Bandel is about 3½ miles and the running time of the train is 17 minutes.

432. In the reverse direction, out of the 13 trains from Bandel to Naihati, only 1 train is overcrowded and that is the train leaving Bandel at 18-34 hours, the carrying capacity being 439. The train gets overcrowded at Hooghly Ghat, the next station after Bandel. The overcrowding is reduced from 534 to 500 at the next station Garifa. There is, therefore, overcrowding between Hooghly Ghat and Naihati, a distance of 3 miles, and this can be eased if standing accommodation is provided in the coaches.

Ranaghat-Bongaon Branch

433. The census figures taken in respect of the trains on the Ranaghat-Bongaon branch on a working day *viz.*, the 14th December, 1955 (Wednesday) show that there is no overcrowding whatever on this section. On the other hand, the occupation of the trains is generally poor. The census figures have not been reproduced but they are available in the original records.

SUBURBAN SYSTEM NORTH OF HOWRAH

Suburban Sections

434. The Eastern Railway Suburban sections converging towards and served by Howrah, on the west side of the river Hooghly, lie to the north of Howrah and comprise—

(*a*) the Howrah-Burdwan section *via* Bandel, commonly known as the Main line,

(*b*) the Howrah-Burdwan Chord,

(*c*) the Bandel-Katwa section on the Bandel-Barharwa loop taking off from Bandel (Mile $24\frac{3}{8}$ on the Howrah-Burdwan Main line, and

(*d*) the Tarakeswar branch taking off from Sheoraphuli (Mile $13\frac{3}{4}$) on the Howrah-Bandel Section.

NOTE.—Bandel-Naihati, Dankuni-Dum Dum have been dealt with, *vide* paragraphs 426 to 432.

Annexure 7 embodies a line diagram of the suburban sections north of Howrah.

The Absolute Block System with Semaphore signals is in use on all the suburban sections, except that there is semi-automatic colour light signalling between Howrah and Sorting Yard Cabin.

Howrah-Burdwan Section via *Bandel*

435. This is a double line section, $66\frac{3}{8}$ miles long, with a maximum permissible speed of 60 miles per hour. The track between Howrah and Belur (Mile $4\frac{1}{8}$) is quadruple. There is a separate workmen's train line between Howrah and Lillooah (Mile $2\frac{7}{8}$), with a maximum permissible speed of 25 miles per hour. There is a second Down line (slow line) between Lillooah (Mile 2-7/8) and Bhadreswar (Mile 17½), with a maximum permissible speed of 45 miles per hour. There is a second Up line between Serampore (Mile $12\frac{1}{8}$) and Sheoraphuli (Mile $13\frac{3}{4}$), with a maximum permissible speed of 25 miles per hour. The line between Saktighar (Mile $59\frac{1}{8}$), where the Howrah-Burdwan Chord joins, and Burdwan (Mile $66\frac{3}{8}$) is quadruple.

There are 33 stations on the section, inclusive of Howrah and Burdwan, the inter-distance between stations varying from $\frac{5}{8}$ to $4\frac{3}{8}$ miles. Of the 33 stations in between Howrah and Burdwan, 2 are Train Halts and 1 is a flag station. The longest block 3 section is $4\frac{3}{8}$ miles, between Gangpur and Burdwan. The overall journey time for trains is of the order of 4 hours for the distance of $66\frac{3}{8}$ miles.

Excluding the trains for chord line and the single train from Sealdah to Howrah *via* Dankuni (Mile $9\frac{3}{4}$) and the 5 trains *via* Katwa, there are 40 trains to Howrah on the section, of which 2 are through trains. Five trains originate from Burdwan for Howrah, 8 trains are from stations beyond Burdwan, 17 originate from Bandel, 7 from Tarakeswar and 1 originate from Sheoraphuli for Howrah. Correspondingly, in the reverse direction, there are

38 trains from Howrah on the section, of which 1 is a through train. Five trains from Howrah tertminate at Burdwan, 7 trains are for stations beyond Burdwan, 17 terminate at Bandel, 7 terminate at Tarakeswar and 1 from Howrah terminates at Sheoraphuli.

Howrah-Burdwan Chord

436. This is a double line section, $58\frac{3}{4}$ miles long, with a maximum permissible speed of 60 miles per hour. There are 26 stations on the section, inclusive of Howrah and Burdwan, the stations being spaced from $1\frac{1}{4}$ miles to $4\frac{3}{8}$ miles. Of the 24 stations in between Howrah and Burdwan, 7 are flag stations and 2 are Train Halts. The longest block section is $4\frac{3}{8}$ miles, between Gangpur and Burdwan. The overall journey time for trains is of 3 hours for a distance of $58\frac{3}{4}$ miles.

There are 16 trains from Howrah to Burdwan on the section, of which 4 are through trains. There is 1 train from Howrah to Sealdah *via* Dankuni. Six trains from Howrah terminate at Burdwan and 3 trains from Howrah are for stations beyond Burdwan, while 2 trains terminate at Chandanpur. In the reverse direction, there are 14 trains to Howrah on the section of which 3 are through trains. There is 1 train from Sealdah to Howrah *via* Dankuni. Six trains originate from Burdwan for Howrah, two trains are from beyond Burdwan and two trains from Chandanpur for Howrah.

Bandel-Katwa Section

437. The Bandel-Katwa section is a single line section of $65\frac{1}{8}$ miles, the total distance of Katwa from Howrah being $89\frac{1}{2}$ miles. The maximum permissible speed is 50 miles per hour between Bandel and Ambika Kalna and 40 between Ambika Kalna and Katwa. There are 24 stations on the section, inclusive of Bandel and Katwa, the inter distance between stations varying from $1\frac{3}{8}$ miles to 5 miles. Of the 22 stations in between Bandel and Katwa, 6 are non-block stations and 4 are Train Halts. The longest block section is 5 miles between Samudragarh and Nabadwip Dham. The overall journey time for trains between Katwa and Howrah is about $4\frac{1}{4}$ hours, for the total distance of $89\frac{1}{2}$ miles.

There are 6 trains, each way, on the section, of which 1 runs between Bandel and Salar and does not touch Howrah. The remaining 5 trains run to and from Howrah, of which 1 is from and to Katwa.

Tarakeswar Branch

438. This branch takes off at Sheoraphuli (Mile $13\frac{3}{4}$). It is a single line section $21\frac{3}{4}$ miles long. The maximum permissible speed is 50 miles per hour. There are 11 stations on this branch, inclusive of Sheoraphuli and Tarakeswar, the inter-distance between stations varying from $1\frac{1}{4}$ miles to $3\frac{3}{8}$ miles. Of the 9 stations in between Sheoraphuli and Tarakeswar, 5 are non-block stations. The longest block section is $7\frac{5}{8}$ miles, between Haripal and Tarakeswar. The overall journey time of trains between Tarakeswar and Howrah is. about $2\frac{1}{2}$ hours for the total distance of $35\frac{1}{2}$ miles.

There are 8 trains on this branch, each way, per day, of which one runs between Sheoraphuli and Tarakeswar, the remaining 7 running between Tarakeswar and Howrah.

Composition of Suburban Trains

439. The suburban trains are composed of steam line coaching stock and are, as a general rule, worked by tank engines. With regard to the availability of tank engines, in respect of the Howrah Division, the Eastern Railway have stated as under, in reply to the Questionnaire issued by the Committee :—

"The total availability of such locomotives is indicated below :—

W M Class	17
BTC Class	6

The present availability of special type of engines as mentioned above is not adequate." With the exception of one train, each way, between Howrah and Tarakeswar (Trains Nos. 129 and 138) which run with 9 bogies, consequent on the inclusion of one curd van, the prescribed normal composition of all the suburban trains is as under :—

2 Bogies	Third Class with Guard and Luggage compartment	Total 8 bogies.
3 Bogies	Third Class	
2 Bogies	composite with Third class and Second Class, and	
1 Bogie	composite with First Class and Second Class	

24 rakes are employed for working the suburban trains on the suburban sections north of Howrah, excluding the 3 rakes which work trains between Sealdah and Dankuni, Burdwan and Howrah and the 2 rakes between Bandel and Naihati. The rake links are furnished on pages XIII and XIV at the end of the Howrah Division Working Time Table.

The general observations made in paragraph 409 *supra*, regarding the types of carriage used on suburban trains, apply to the suburban sections north of Howrah as well, except that the average proportion between the I, II and III class accommodation is 1 : 3 : 25 as against 1 : 5 : 38 in respect of the Sealdah section.

Frequency of Train Service

440. The Train Charts (*Annexures* 25 *and* 26*) indicate that Howrah receives 87 (of which 9 are through trains) and despatches 86 trains (of which 9 are through trains) per day.

The number of trains arriving at and leaving Howrah during the morning and evening rush periods are detailed below :—

		Morning			*Evening*			
		8 hrs. to 9 hrs.	9 hrs. to 10 hrs.	10 hrs. to 11 hrs.	16 hrs. to 17 hrs.	17 hrs. to 18 hrs.	18 hrs. to 19 hrs.	19 hrs. to 20 hrs.
Arrivals	*Eastern Railway.* *Main Line* via *Bandel.* Suburban . .	7	7	4	2	2	1	2
	Through . .	..	..	..	..	..	..	..
	Chord Line. Suburban . .	1	3	..	..	..	..	..
	Through . .	..	1	1	..	..	..	..
	South Eastern Rly. Suburban . .	3	3	2	1	1	1	1
	Through . .	..	..	..	..	..	..	..
	(*a*) TOTAL .	11	14	7	3	3	2	3
Departure	*Eastern Railway.* *Main Line* via *Bandel.* Suburban .	2	1	1	4	4	5	3
	Through . .	..	..	..	..	..	..	..
	Chord Line. Suburban . .	..	..	1	1	2	1	1
	Through . .	..	..	..	..	..	..	1
	South Eastern Rly. Suburban . .	1	1	1	1	3	2	2
	Through . .	..	..	..	1	..	1	..
	(*b*) TOTAL .	3	2	3	7	9	9	7
	GRAND TOTAL *i.e.* (*a*) plus (*b*) . .	14	16	10	10	12	11	10

---

* Not Printed.

NOTE—Trains extending beyond the suburban area but serving one or more suburban stations are treated as suburban trains.

These trains are dealt with on 13 platform lines which are gathered into two sets, to permit of simultaneous reception and despatch of several trains.

Passenger Traffic and Train Requirements

Howrah-Bandel Section

441. The census figures taken for a working day *viz.*, 28th December 1955 (Wednesday) between Bandel and Howrah in respect of the local trains arriving at Howrah between 8 and 11 hours in the morning, are extracted in the chart (*Annexure* 51*). There are 16 local trains arriving at Howrah during the period.

1 of which is from Katwa,

3 of which are from Burdwan,

8 of which are from Bandel,

3 of which are from Tarakeswar, and

1 of which is from Sheoarphuli,

their carrying capacity varying from 653 to 942. The difference in the carrying capacity is due to the various types of coaches used on the suburban trains.

442. The census figures for the journeys of the trains from Katwa and Burdwan up to Bandel and for the journeys of the trains from Tarakeswar up to Sheoraphuli have been taken but they have not been reproduced for the sake of brevity. They are, however, available in the original records. It is seen from these census figures that the occupation of the trains from Burdwan and Katwa, when they arrive at Bandel, and the occupation of the trains from Tarakeswar, when they arrive at Sheoraphuli, are less than their carrying capacities. The chart, *Annexure* 51*, indicates that only two trains get overcrowded from Bandel, while the others get overcrowded later on. The number of overcrowded trains increases from Sheoraphuli/Serampore. One train *viz.*, S. 130 from Tarakeswar does not get overcrowded anywhere. The portion where the majority of the trains are overcrowded and the passenger occupation is most dense is between Uttarpara and Howrah, a distance of 6 miles covered in about 27 minutes. The total of the maximum number of passengers on each of the fifteen overcrowded trains at any point on the run comes to 14,620 or an average of 975 per train. The maximum number on any one train at any one time is 1,175.

443. The corresponding census figures in respect of the local trains starting from Howrah in the evening between 16·15 and 19·30 hours are extracted in the chart (*Annexure* 52*). There are 12 local trains leaving Howrah during the period, their carrying capacity varying from 606 to 1022. As already explained, this variation in carrying capacity is due to the difference in the accommodation of the different types of carriages used on suburban trains. Of these 12 trains, 1 is for Katwa, 2 are for Burdwan, 7 are for Bandel and 2 are for Tarakeswar. It will be seen from the chart, that, of the 12 trains, 9 are overcrowded when leaving Howrah itself. Secondly, the first two trains get further overcrowded at Lillooah, Belur and Bally. Thirdly, the first 3 trains receive an appreciable number of passengers at Hind Motor Halt, apparently, owing to the workmen from the Hindustan Motor Automobile Factory near the Train Halt returning home after work. Fourthly, the overcrowding ceases entirely at Sheoraphuli except in the case of one train (No. S. 119) which runs through Sheoraphuli and becomes normal at the next halt. There is no overcrowding whatever by the last train, *viz.*, S. 169. The portion where the majority of the trains are overcrowded and the occupation is generally most dense is between Howrah and Serampore, a distance of 12 miles covered in about 39 minutes. The total of the maximum number of passengers on each of the eleven overcrowded trains at any point on the run comes to 10,381 or an average of 944 per train. The maximum number on any one train at any one time is 1,356.

444. The effects of excessive overcrowding can be minimised by the provision of greater accommodation on the trains and the addition of one more train between Howrah and Sheoraphuli or a station short of it in each direction.

Howrah-Burdwan Chord

445. The census figures taken for the Burdwan-Howrah section *via* Chord on working day, *viz.*, 3rd January 1956 (Tuesday) in respect of the local trains arriving at Howrah between 8 and 11 hours are extracted in the chart (*Annexure* 53*). There are 4 local trains arriving at Howrah during the period, their carrying capacity varying from 666 to 739. Of the 4 trains, 3 are from Burdwan and 1 from Chandanpur. The last train (which comes

---

* Not Printed.

from Burdwan) gets overcrowded at Chandanpur while the first two trains (also coming from Burdwan) get overcrowded at Mahmudpur and the third train (which comes from Chandanpur) gets overcrowded later on at Gobra. The portion of the line where the majority of the trains are overcrowded and the occupation of the train is most dense is between Begumpur and Howrah, a distance of 13¾ miles covered in 48 to 55 minutes. The total of the maximum number of passengers on each of the four trains at any point on the run comes to 4,610 or an average of 1,152, per train. The maximum number on any one train at any one time is 1,307.

446. The corresponding census figures in respect of the local train starting from Howrah in the evening between 16-15 and 19-30 hours are extracted in the chart (*Annexure* 54*). There are 3 local trains leaving Howrah during the period, their carrying capacity varying from 641 to 1,062. Of the 3 trains, 2 are for Burdwan and 1 is for Chandanpur. All the 3 trains are overcrowded when leaving Howrah. The overcrowding by the first train ceases at Madusudanpur, the overcrowding by the second train ceases at an earlier station Begumpur and the overcrowding by the third train ceases earlier still at Belur. The section of the line where the majority of the trains are overcrowded and the occupation of the train is most dense is between Howrah and Begumpur. The total of the maximum number of passengers on each of three trains at any point on the run comes to 3,184 or an average of 1,061, per train. The maximum number on any one train at any time is 1,397.

447. All the three trains run in the Up direction from Howrah, with the exception of one train, have rather low carrying capacities and had the two trains been run with bigger carrying capacities, there would have hardly been overcrowding.

SOUTH EASTERN RAILWAY SUBURBAN SYSTEM

Suburban Sections

448. The suburban sections of the South Eastern Railway comprise—.

(*a*) the Howrah-Ballichuk section on the Howrah-Khargpur line, and

(*b*) the Santragachi-Shalimar section, this section being a branch line taking off from Santragachi on the Howrah-Ballichuk section.

Annexure 8 embodies a line diagram of the suburban sections.

As already stated in paragraph 402 *supra*, Howrah station (which is worked by the Eastern Railway) deals with the trains of the South Eastern Railway, in addition to the Eastern Railway trains. Trains from and to the South Eastern Railway are dealt with at Howrah on platforms 7 to 11 which are situated in the south wing of the station. Platform No. 11 is a dead end which does not permit of the releasing of the engine. These platforms are also used by the Eastern Railway trains. Both the railways are of the view that extra trains cannot be dealt with at Howrah at present.

The Absolute Block System with semaphore signals, is in use on the suburban sections, except that there is semi-automatic colour light signalling between Howrah and Tikapara.

Howrah-Ballichuk Section

449. There is a double line section, 56¾ miles long. The maximum permissible speed is 60 miles per hour. There are 25 stations on the section, inclusive of Howrah and Ballichuk, the distance between stations varying from 1 to 4¼ miles. The longest block section is 6 miles, between Panchkura and Haur. Of the 23 stations in between Howrah and Ballichuk, one is a train halt and the remaining 22 are block stations. Of these 22, only 10 are provided with loop lines which permit of precedence of trains, with the result that a train which has to be preceded by another train has to be held up at an earlier station where there is loop permitting of precedence, resulting in heavy detentions to trains. Examples of such detentions are given below :—

(*i*) S. 25 Up Howrah-Panchkura Local at Andul for 14 minutes to give precedence to 43 Up Howrah-Madras Mail.

(*ii*) S. 27 Up Howrah-Panchkura Local at Bauria for 14 minutes to give precedence to 42 Up Howrah-Bombay Mail.

(*iii*) S. 5 Up Howrah-Panchkura Local at Machada for 19 minutes to give precedence to 42 Up Howrah-Bombay Mail.

---

* Not Printed.

8—1 D. T. (Rly· Bd.)56.

In the case of item (*i*), the running time for train No. S. 25 from Andul to the next station Sankrail is 6 minutes, but the train has to be held up, apparently, at Andul itself for want of an Up loop to permit of precedence at Sankrail. Similarly, in the case of item (*ii*), the running time for train No. S. 27 from Bauria to the next station Chengail is 5 minutes but the train has to be held up, apparently, at Bauria itself for want of an Up loop line at Chengail. With regard to item (*iii*), there is no loop to permit of precedence at the next station Bhogpur. The running time for S. 5 from Machada to Bhogpur is 10 minutes.

Apart from 4 through trains, each way, which do not cater for suburban traffic, there are 23 trains from Howrah and 24 to Howrah, per day, on the section. The local trains on the section originate from and terminate at Panchkura, Machada and Deulti, there being no train originating from or terminating at Ballichuk, as the volume of traffic at stations between Panchkura and Ballichuk is not heavy and passengers travelling to and from these stations use the non-suburban services.

The time taken by trains between Howrah and Ballichuk is 3½ hours, for the distance of 56¾ miles and journey time of trains between Howrah and Panchkura, Howrah and Machada and Howrah and Deulti are about 2¾ hours, 2 hours and 1¾ hours respectively, for the distance of 44, 36½ and 31¾ miles, respectively.

With regard to turn-back signalling facilities at the terminals, signalling has been provided at Machada for a Down local to start from the Up platform line without having to transfer the rake on to the Down platform line. Provision of similar facility at Panchkura has already been sanctioned and the work is expected to be taken up shortly. Incidentally, the Committee observed, in the course of their investigation, that, at Panchkura station, the existing cross over between the Up and Down lines at the Khargpur end is not sited properly, with the result that an Up suburban train received on the Up loop line (platform line) has to be drawn ahead and backed to the Down Main line and then drawn ahead again and backed on to the Down loop (platform) line for despatch to Howrah. The provision of proper turn back facilities at Deulti station also, which is one of the three outer terminals, should be kept in view. Another factor deserving attention, in this context, is that the Ludlow Jute Mills siding at Mile 17/12 and the Mafatlal Gagalbhai Jute Mills siding at Mile 17/23 which take off from the Up loop line between Chengail and Fuleshwar are not long enough to permit of the pilot train to be isolated on the sidings and the main line freed for the passage of the main line trains. The result is that the Block section is not available for main line trains until the pilot returns to the station from the siding.

Shalimar Branch

450. This short double line branch of 3 miles takes off the Howrah-Khargpur line at Santragachi. The only intermediate station on the branch is a Train Halt, a mile and a quarter from Santragachi. The maximum permissible speed is 40 miles per hour. There are 8 trains, each way, per day, on the branch and the overall journey time is 13 minutes for the distance of 3 miles.

Composition of suburban trains

451. The suburban trains are composed mostly of ordinary coaching stock. Besides Third class accommodation, both First and Second class accommodation are provided on suburban trains, the average percentage of each class being as under :—

First class	1·7%
Second class	9·7%
Third class	88·6%

Separate compartments for women are reserved in the third class but not in the upper classes. All coaches are provided with toilet facilities.

All the suburban trains are worked by WM class tank engines. The total number of tank engines (WM class) available on the railway is 20 out of which 19 are available for suburban traffic. The South Eastern Railway consider that these 19 tank engines are just enough for the existing services and, therefore, no additional train can be introduced even inside the peak period and that the clearance of passengers during the peak period cannot be increased by augmenting the loads of trains as the WM type of engine cannot haul more than the present load of 8 bogies.

All the suburban trains are composed of 8 bogies as under :—

1 Bogie First and Second.

5 Bogies Third.

2 Bogies Third with Guard and Luggage compartment.

8 Total bogies

The railway have only 32 special type carriages with sliding doors, maximum passenger carrying capacity, etc., suitable for suburban trains as against their total requirements of 88. The balance is made up with ordinary coaching stock which, for the most part, consists of old main line stock. The suburban trains as well as the trains between Howrah and Midnapore are worked by 11 rakes, the link of which is furnished on page V of the Appendices at the end of the Khargpur District Working Time Table—Part I.

Frequency of Train Service

452. As will be seen from the Train Chart (*Annexure* 27*) the total number of trains starting from Howrah, in a cycle of 24 hours, is 27, of which 4 are through trains. The total number of trains arriving at Howrah, in a cycle of 24 hours, is 28 as will be seen from the Train Chart (*Annexure* 28*).

Passenger Traffic and Train Requirements

Howrah-Panchkura Section

453. The census figures taken on the Panchkura-Howrah section, on a working day, *viz.*, 21st December 1955 (Wednesday) in respect of the local trains arriving at Howrah from 7 hours to 11 hours are embodied in the chart (*Annexure* 55*). During this period there are 9 local trains to Howrah.

3 from Panchkura,

4 from Machada, and

2 from Deulti.

The carrying capacity of the trains vary from 678 to 787. It will be seen from the chart that there is no overcrowding whatever in the case of any of the trains up till Bir-Shibpur. Of the 5 local trains, arriving at Howrah between 7 hours and 9 hours, only one train *viz.* S. 14 arriving at Howrah at 7–24 hours gets really overcrowded. This train is overcrowded first between Ulubaria and Chengail, apparently due to the mills situated near Chengail. The overcrowding ceases at Chengail and starts again at Andul and increases up to Howrah. In regard to the 4 local trains arriving at Howrah between 9 hours and 11 hours, one train is overcrowded between Bauria and Howrah and the other 3 trains from or about Andul to Howrah. The portion where there is general overcrowding and also the occupation of trains is most dense is between Andul and Howrah, a distance of 7¾ miles, covered in about 34 minutes. The total of the maximum number of passengers on each of the five overcrowded trains at any point on the run comes to 5,349, or an average of 1,070 per train. The maximum number on any one train at any one time is 1,250.

454. The corresponding census figures taken on the Howrah-Panchkura section in respect of the local trains leaving Howrah between 16 and 20 hours are tabulated in the chart (*Annexure* 56*). There are 7 local trains leaving Howrah during the period, 3 for Panchkura, 3 for Machada and 1 for Deulti, their carrying capacity varying from 693 to 787. All the 7 trains are overcrowded at Howrah excepting one *viz.*, S. 7 leaving Howrah at 18–05 hours, which does not get overcrowded anywhere. The overcrowding in train S. 3 decreases until it arrives at Chengail where the train is again heavily overcrowded, apparently owing to the mills near that station, and the overcrowding ceases when the train leaves Kulgachia. Barring this train, which serves as a mill hands train from Chengail, the portion where there is generally overcrowding and the occupation is most dense is between Howrah and Andul. The total of the maximum number of passengers on each of the six overcrowded trains at any point on the run comes to 6,192 or an average of 1,032 per train. The maximum number on any one train at any one time is 1,527.

---

* Not Printed.

455. The effects of excessive overcrowding can be minimized by the provision of greater accommodation on the trains and the addition of one more train between Howrah and Andul or a station beyond in each direction.

Santragachi-Shalimar Section

456. The census figures taken on the Shalimar-Santragachi section on a working day *viz.*, 21-12-55 (Wednesday) in respect of the trains arriving at Shalimar between 7 hours and 11 hours are embodied in the chart (*Annexure* 57*). There are 4 trains arriving at Shalimar during the period, their carrying capacity being 196. Two of the 4 trains are overcrowded when leaving Santragachi, the number of passengers on train being 202 and 249 respectively. The overcrowding in one of them ceases at the next halt *viz.*, Padmapukur. The other train gets further overcrowded at Padmapukur to the extent of 270 passengers.

457. The corresponding census figures taken on the Shalimar-Santragachi section in respect of the trains leaving Shalimar between 16 and 20 hours are tabulated in the chart (*Annexure* 58*). There are 3 trains leaving Shalimar during the period. Two of them are overcrowded even when leaving Shalimar and the overcrowding increases in both the trains at the next halt *viz.*, Padmapukur, the number of passengers on train when leaving that station being 296 and 339. There is no overcrowding by the last train *viz.*, S. 43, leaving Shalimar at 18-28 hours.

458. In view of the fact that this short branch of 3 miles is worked by an engine in the centre with a coach at either end shuttling to and fro 8 times each way every day, we feel that the best way of avoiding excessive overcrowding is to provide standing accommodation only on this service which would comfortably accommodate the largest numbers known to travel on this section. Since the period of run is only 13 minutes, no great inconvenience ought to be felt. The maximum number of passengers on any train recorded in our census is 339, some of whom travel only half the way.

---

*Not Printed.

CHAPTER V

OVERCROWDING IN SUBURBAN TRAINS AND STAGGERING OF WORKING HOURS AS A REMEDIAL MEASURE

Collaboration of the Public in Solving the Problem of Overcrowding

501. In the course of our investigations, we were impressed with the keen interest shown by the public in the measures which the Railway Administration should take to stem excessive overcrowding; and we have accordingly devoted the bulk of our report to the remedial action to be taken by the Railways. We, however, should not be doing adequate justice to the problem, were we not to touch upon its social aspect and indicate the directions in which social organizations collectively and the passenger public individually can collaborate in its solution. These directions may be broadly classified as under:

(a) Staggering of working hours.
(b) Dispersal of Factories, Offices and other Establishments.
(c) Passenger Discipline and Co-operation.

The Problem of Overcrowding

502. In the first place, we have to accept overcrowding as an unwelcome feature of growing industrialization and urbanization in every country. The Indian Railway Delegation (1954) to the Soviet and other European Railways have remarked in their report:

> "During peak hours of traffic suburban trains everywhere get overcrowded and sometime to the extent of more than 200 per cent. of their seating capacity".

Not only are trains or other means of transport overcrowded, but also are the city roads, schools, hospitals and housing estates. In transport, overcrowding takes place whenever large numbers of people with similar purposes have to live together, move about in the same direction and almost at the same time. Unless deliberately planned and controlled, zonal or uniform development of cities does not take place, transport problems become complex, and when financial resources are limited, the endeavour to adopt solutions naturally lags behind the needs of the situation.

503. Most cities have developed from or round a busy centre, where the banks, commercial houses, administrative, professional and legal offices and educational institutions are located, and which on each week day hum with activity of persons bent on their daily routine and drawn from more or less far flung residential areas to which they disperse each evening. These waves of population movement between residential areas and city gain in volume twice or more often in a day according as industrial undertakings develop. While certain civic amenities like water and gas can be stored and turned on as desired, transport on the taps an ideal far more expensive and far from easy to realise. Wherever suburban passenger traffic is heavy, an electric train service is found to be the most economical, satisfactory and efficient means of carrying it. The exceedingly high demand for electric power caused during rush hours of suburban traffic can only be met by the sinking of large capital on electric generating plant and its ancillaries which for the rest of the day will have to remain idle or partially so. Even electric power cannot be stored, while the economics of transport will not justify the procurement and maintenance of a large fleet of rolling stock on the basis of the rush period, if it can find no profitable use for the rest of the day.

Staggering of Working Hours

504. Under the circumstances, in the interests of the community, it is imperative that a compromise is struck between the sinking of unjustifiably heavy capital and a better utilization of such travel facilities as can be reasonably afforded. The optimum use of transport can be achieved through varying the hours of work for different activities, or having the same work distributed over different areas of the city. "Staggering", as this process is called, tends to diminish the suddenness and the magnitude of the rush of passengers, and effects a more even spread over a longer stretch of time. It is the application of the same principle in recent years in Bombay that has enabled the electricity supply to meet the rising demand for power from industry; factories and mills have, as a result, staggered the weekly and periodical holidays, and employees have become accustomed to the change. Likewise in the extreme heat of the North Indian Summer, certain offices resort to changing the hours of work to the cooler hours of the morning, and staff adjust their habits to suit.

505. Just as climatic changes call for an adjustment of working hours every year, so also can economic necessity or personal advancement cause individuals to reconcile themselves to similar changes. Already in large sections of industry, textile mills, steel and iron plants, oil refineries and electricity generation, employees and a considerable section of the supervisory staff are working on shifts. Again, changes of fortune in employment or prospects of promotion have equally effectively induced persons to change from day-time to shift working. Citizens of this class are fairly well interspersed among families, whose normal vocation has been a profession or a business. They cannot, therefore, disclaim acquaintance with this aspect of industrial life. As canteens in factories, shops, schools, colleges and offices multiply the lunch away from home becomes a necessity and then a habit.

506. In our Questionnaire issued to the railways in October, 1955, and to the public in November, we elicited views on the proposal of staggering as a remedy so as to obtain information on past experience and their views in general. It is gratifying for us to note the move recently initiated by the Bombay Municipality's Transport Undertaking (B.E.S.T.) and referred to in their answer to this Committee's Questionnaire suggesting staggering as one of the measures to mitigate overcrowding. A circular was being issued by B.E.S.T. to all industrial and commercial establishments in Bombay seeking information on their working hours at present, the views of their management and staff on the advisability of adopting Staggering, and their willingness to co-operate. During the visit of this Committee to Bombay, a daily newspaper, 'The Indian Express', Bombay edition, dated 10-1-56 reported a speech by the Chairman of the Standing Committee of the Bombay Corporation advocating the convening of a round table conference of B.E.S.T., the Police and Businessmen for the same purpose.

507. The Estimates Committee of Parliament also, in paragraph 23 of their report dated December, 1955, on the operation of Indian Railways, recommended the examination of the question of "Staggering the office hours at Calcutta, Bombay and Madras" in consultation with State Governments and local business offices so that the peak period can be spread out.

508. The question of staggering was also discussed by the Chief Minister, Bombay State, as far back as May, 1950, at his monthly meetings with the General Managers of the Central and Western Railways. Press propaganda and poster display were carried out for a time. Like other bright ideas requiring public co-operation, it was dropped when the drive behind the movement weakened and was overcome by the initial resistance from the public. In Madras, according to a reply to our Questionnaire received from the Madras Suburban Railway Passengers' Association (Electrified Section), West Mambalam, "the staggering of opening and closing times of offices was experimented by the Madras Government to relieve congestion in buses following the close-down of the tramways. In practice, it was found to be inconvenient and unworkable since it did not bring forth the expected result. Consequently, all the offices, industrial concerns reverted to their original timings". Here too initial discouragement put an early end to the experiment. As regards Calcutta city, answers received by us indicate that trials have not, so far, been made there in regard to staggering.

509. We are aware that the initial reaction of the public to the demand for further advance in this direction is one of opposition. Of the 270 replies to the questionnaire received by us, 31 were neutral, 185 were against staggering and only 54 in favour. The proposal generally seems to have been received with a sense of fear and doubt, for some replies suspected that offices would open at as early as 8 a.m. and the office staff turned out at 3 p m. A modest measure which seeks to open certain offices at 9 a. m. others in batches or zones, each batch or zone opening every successive half hour up to 11 a.m. will go very far to spread out the demand for transport over a greater number of hours. The change or adjustment of habits needed is not so radical as some passenger associations have depicted.

510. All these trends augur well for the future, but "Staggering" to be effective needs an insistent and long term consciousness in the public mind, fostered by periodical conferences and adjustments and encouraged more by example than precept from Government Organisations and nationalised undertakings. It can be followed by propoganda on a wider front with co-operation from trade, business and industry both the management and employees' associations alike. While the public in a democracy will not fail to respond favourably to persuasion and example, it is overjealous and critical of demands on it.

Dispersal of Establishments

511. We have received a cogently written statement from a citizen of Bombay, very co-operative generally in its tenor belauding the recent action by a leading insurance company in moving the bulk of its offices to the suburbs but pointing as retrograde the scheme

of the Western Railway to erect a block of offices on the top of the Churhgate terminal station. Among several industrial firms who have moved into the suburbs, mention may be made of Messrs. Godrej and Boyce Manufacturing Co., Ltd., Manufacturers of steel furniture, etc. Besides their large factory, residential accommodation has been provided for 500 families of employees: the target for staff quarters is 3,000 in the near future. Dispersal of institutions is a very important means to mitigating overcrowding, which should receive careful consideration from all organizations in the City, whether Industrial, Commercial, Educational, Municipal, State or Union Government. We are, therefore, of the opinion that the State Governments and Municipal Corporations in these cities can achieve a measure of success, if they consistently pursue a policy conducive to staggering of working hours, and dispersal of establishments and industrial colonies, and institute a joint Council for the purpose, which will by periodical meetings review and initiate suitable measures to implement the policy from time to time. Railways should also be represented on it. As a matter of fact, we recommend that the Railway Administrations, which have large concentrations of staff at these cities, might, with a view to setting an example, examine the implications of introducing staggering in their own offices and the effect which such a measure will have on the traffic.

Passenger Discipline and Co-operation

512. It will not be out of place to make comparisons between the long distance and suburban passengers on railways, and again between the suburban railway passenger and the city bus passenger. The suburban passengers issuing out each morning in endless streams from the exists of city termini like Victoria Terminus and Churchgate in Bombay, and Howrah and Sealdah in Calcutta are a striking sight to casual visitors to those cities: equally amazing is the return surge in the evening pouring into trains outward bound from the city.

513. In these hurrying crowds of passengers, no one carries, any luggage or kit, unless he is a vendor of produce visiting the market or a small store keeper in the suburbs replenishing his stock. While in transit the suburban passenger needs no toilet facilities, and even seating accommodation hardly counts for him, if the destination is reached in a few minutes. More unescorted children and women are found in the coaches of suburban trains than on long distance services. Perhaps for the infirm, the aged or the young, seating comfort matters much and is often a need.

514. The suburban railway coach resembles the city bus in some respects-seating arrangement, shortness of runs, quick get-a-way, frequent and sudden stops. But there is one important difference: the absence on railway coaches of the counterpart of the bus conductor who besides selling tickets and collecting fares controls the passengers, encourages the queue habit in the waiting passengers, watches that alighting passengers get precedence at the door-way over boarding passengers, prevents filling the buses beyond capacity and turns away persons who suffer from infectious diseases. The only person in the train to perform these functions is the Guard at the rear, but both the shortness of the halt at stations and the length of train preclude effective attention from him. It therefore, devolves on the travelling citizen to cultivate the sense of good and safe travel and ensure it through mutual co-operation and discipline while entraining or alighting. Instances of passenger co-operation and discipline are already in evidence; for example, on the electrified suburban section (M.G.) of the Southern Railway, despite the absence of special seats or compartments in the upper class for ladies they do not suffer, because men readily give up their seats as lady passengers enter the coach.

515. It must be admitted, however, that any propoganda which will promote such essential co-operation from the suburban passengers must pay due regard to his other needs and be preceded by at least minimum standards of sure, safe, adequate and punctual suburban train service. To the vast majority of suburban rail passengers, rail travel is no occasional excursion, but a stern necessity. It is perhaps the first move in the daily struggle for existence, and its trials will tinge his outlook and temper during the day. If, to the shortcomings of the journey to work are added the trials of the journey back home, the final burden of mental fatigue he carries home in the evening can be heavy indeed. On the other hand, an efficient transport system will not fail to induce efficiency and a sense of co-operation in the urban worker who starts the day as a suburban traveller.

Future of Suburban traffic

516. In concluding the comparative features of suburban travel, it may be remarked that the most important factor that attracts traffic at present is the comparative cheapness of the season ticket on railways, whereas single journey bus fares, added over the month are several

times the fares charged by the Railways and amount to a sizable portion of the income of the bulk of the passengers. So long as the facility of unlimited travel with railway season tickets continues, the suburban railway services will always be popular with the city worker and others who have to travel daily between home and the place of work.

517. There is little danger of demands on Suburban Railways decreasing—the only factor that can contribute to a decrease is the dispersal of factories and offices to self contained town-ships, provided that such town-ships really employ most residents locally. Such planned dispersal of industry is an ideal unlikely to be achieved early and cheaply. Pressure on railway suburban service is, therefore, not likely to diminish to any appreciable extent.

518. Page 143 of the draft outline of the second five year plan provides for an increase of 15 per cent. in train services, over the five year period, to enable the railways to meet the anticipated increase in traffic. Since industrial targets in the plan will cause all round increases in the industrial activity of existing centres like Calcutta, Bombay and Madras, the increase in suburban passenger traffic will, if anything, be greater than 15 per cent. on the whole. Where railways are electrified and transport facilities materially increase, passenger traffic is bound to catch up with the facilities, provided the country's plans for prosperity do not receive a set back from unforeseen causes.

CHAPTER VI

INCREASE IN TRAIN CARRYING CAPACITY AS A REMEDIAL MEASURE

Computation of Carrying Capacity

601. The number of a passengers that are normally meant to be carried in a train is arrived at by totalling the carrying capacity marked in each compartment of the coaches forming the train. With the exception of the EMU stock in Bombay, the carrying capacity everywhere represents the number of seats provided in the coaches, and this practice is observed even on the EMU stock on the electrified section of the Southern Railway. The necessity for a different method, followed on the Bombay electrified railways, appears to have arisen from the recognition of a basic principle of suburban travel that, since journeys are short, and the number of travellers increases as the train approaches the city, it becomes impracticable to provide seats for all passengers, and short distance passengers have to be content only with standing accommodation. The designs for suburban stock therefore specifically provide for standing room and hand-hold arrangements for standing passengers; and, it is only fair that their number should be included in the marked carrying capacities. Where, however, little or no standing room is left, and the coaches are filled with seats to their utmost capacity, as obtains on most other stock, the number of seats practically represents the entire carrying capacity. It is obvious that a uniform system of marking carrying capacity of coaches is desirable over all the suburban sections of Railways.

Comparative study of the carrying capacities of an eight coach train

602. The carrying capacity of a rake varies directly as the number of coaches forming it. Since this number frequently varies, we may begin by considering an 8 coach train, which is the most common in use. Dealing with the Broad Gauge sections, 8 coach trains are standard on the Calcutta Suburban Railways, the Madras Broad Gauge Suburban Railways and the EMU stock of the Bombay Railways and, as such, offer us a good example for study. Since the type of coaches in rakes varies, it should suffice, for the present, to study a few typical cases, details of which are extracted below and presented in tabular form:—

Carrying Capacity of eight Coach Rakes

Name of Region and Railway	Type of Stock	Capacity by Class.			Capacity whether seated or standing		Total
		I	II	III	Seated	Standing	
Calcutta:—							
Eastern Railway:—							
Howrah Division	24 rakes No. 42 and others	12	72	605	689	..	689
	1 rake No. 13	12	136	560	708	..	708
	6 rakes Nos. 1-6	32	144	576	752	..	752
	2 rakes Nos. 7 and 11	32	130	604	766	..	766
	3 rakes Nos. 8, 9 and 10	40	50	820	910	..	910
Sealdah Division	Rake No. 87	24	68	398	490	..	490
	Rake No. 77	32	38	650	720	..	720
	Rake No. 90B	16	96	742	854	..	854
	Rake No. 66	32	38	782	852	..	852
South Eastern Railway:—							
	S/23 Up	10	69	522	601	..	601
	S/16 Down	18	30	630	678	..	678
	S/14 Down	6	6	674	686	..	686
	S/21 Up	12	69	636	717	..	717
	S/25 Up	12	69	674	755	..	755
	S/1 Up	12	69	706	787	..	787
Madras:—							
Southern Railway:—							
		Details not available			709	..	709
					777	..	777
					804	..	804
					840	..	840

Name of Region and Railway	Type of Stock	Capacity by Class			Capacity whether seated or standing		Total
		I	II	III	Seated	Standing	
Bombay:—							
Central Railway:—							
	Electrified Stock						
	10′ old stock . . .	148	..	1116	670	594	1264
	12′ old stock . . .	202	..	1246	858	590	1448
	12′ new stock . . .	296	..	1248	830	714	1544
Western Railway:—							
	12′ old stock . . .	243	..	1253	942	554	1496
	12′ new stock . . .	290	..	1278	834	734	1568

603. Before looking into the table, it should be remembered that stock for suburbans services on the steam hauled sections is generally very old; many carriages have doors opening out-wards, and, very often, stock unfit for main line use is utilised for the suburban service. The Eastern Railway, which employs 658 coaches, being short of suburban stock, is endeavouring to make up the shortage with 26 non-suburban type coaches. They have also stated that no more suburban type coaches are being built by them, in view of the electrification scheme already under execution. The South Eastern Railway, which employs 88 coaches, have only 32 specially designed for suburban service. The Southern Railway, which employs 99 carriages on the Broad Gauge, have stated that no specially designed suburban coaching stock is available.

604. As a general rule, room for passengers to stand is almost non-existent in steam trains, as space is mostly taken up by seats, which vary from 100 to 150 in a single third class bogie. In judging of these figures, it must be borne in mind that the number of seats provided in the latest designs of main line stock is 76 in HAL coaches, 96 in all metal coaches produced by Jessops and 80 in coaches of the latest design on the newly introduced Janata train running between Bombay and Poona. Each train consisting of 8 coaches of the last kind will have a carrying capacity of 560 only, allowing half a coach at each end for Guard's and Luggage compartments.

605. A scrutiny of the carrying capacities of different rakes in the foregoing table suggests that the Railways are carrying far fewer passengers per steam train than per electric train. This difference cannot be attributed to anything inherent in electric traction. Nor can it be due to wider stock being in use on the electrified sections, for the difference of about 1′-4″ between 10′-8″ and 12′ cannot account for more than say 15%. Even if the figures were so adjusted, the shortage in carrying capacity is still considerable, and calls for serious notice. What, then, is the real cause of this difference? It is mainly the evolution of coach design with special features to meet the specific conditions of suburban travel that has brought about the striking increase in carrying capacity. Ordinary main line coaches, designed for other conditions of travel, naturally lack the special features needed for suburban travel and are, therefore, easily overcrowded with a rush of passengers that would only half fill a standard suburban coach. These features and other measures enumerated below, therefore, call for attention in combating overcrowding and foot-board travel:—

(i) Creation of space for standing passengers.

(ii) Reduction in the number of classes of passengers.

(iii) Equitable distribution of accommodation between the Upper and the Lower classes.

(iv) Reservation of seats, instead of compartments, for ladies.

(v) Removal of partitions between compartments, and reduction of lavatory accommodation.

(vi) Replacement of existing brake vans on steam trains by shells for multi-purpose usage.

(vii) Augmenting the loads of trains.

(viii) Introduction of stock specially equipped for suburban travel on the steam sections.

Creation of space for standing passengers

606. In studying the space required for passengers to travel whilst seated or standing, the example of the accommodation provided in the latest stock in use on the Bombay electrified railways will be very instructive. An analysis of the accommodation provided in the new 12 feet stock is given below:—

NEW 12′-0″ EMU STOCK

Details for one unit	Distribution of Floor Area.						Passengers						
	Accommodation in sq. ft.			Total	Percentage of Total		Number			Percentage of Total		Area allocaed per passenger in sq. ft.	
	Seating	Standing			Seated	Standing	Seated	Standing	Total	Seated	Standing	Seated	Standing
		Doorways	Gangways										
Motor Coach A Lower Class (with luggage comparment). Area 121 Sq.ft.	305	157	39·5	502	60%	40%	81	69	150	55%	45%	3·77	2·85
Motor Coach D Lower Class.	396	186	60	642	68%	32%	110	84	194	57%	43%	3·6	2·93
Trailer Coach C Upper Class.	368	186	40	594	62%	38%	76	72	148	51%	49%	4·84	3·14
Lower Class	95	62	7	164	58%	42%	26	24	50	52%	48%	3·65	2·88
Trailer Coach B Lower Class.	443	248	72	763	58%	42%	122	108	230	53%	47%	3·63	2·96
			839	219									
Total for one unit of coaches.	1607		1058	2665	60%	40%	415	357	772	54%	46%	3·87	2·96
Total for a 2 unit rake of8 coaches	3214		2116	5330	60%	40%	830	714	1544	54%	46%	3·87	2·96

NOTE 1. In times of rush, when the total number of passengers in the train increases, the standing room, per passenger, decreases as follows:—

Total No. of Passengers per train (rake of 8 coaches)	No. seated	No. standing	Space per standing Passenger.
1544	830	714	2·96
1700	"	870	2·43
1900	"	1070	1·98
2100	"	1270	1·67
2300	"	1470	1·44

NOTE 2. Each unit has a luggage compartment of 121 sq. ft. which provides standing accommodation for 40 to 80 passengers. In two such compartments that are to be found on a rake of 8 coaches, 80 to 160 passengers can travel in addition to the numbers indicated in the table and Note 1.

607. In the foregoing Table, details are given for each of the 4 coaches forming a unit, two of which go to form a 8-coach rake which is our standard under consideration. The distribution of space for different purposes is also detailed, from which the following inferences may be drawn:—

(i) The area occupied by the seats including, of course, the space between the seats for leg room is 3214 sq. ft., in which 830 passengers are seated. This gives an average of very nearly 4 sq. ft. per seated passenger. The actual space per seated passenger varies from 3·6. sq. ft. to 3·77 sq. ft. in the Lower Class and is 4·84 sq. ft. in the Upper Class.

(ii) The space taken up by the door-ways and gang-ways, which is available for standing passengers, is 2116 sq. ft., in which normally 714 passengers are expected to stand. This gives standing room equivalent to about 3 sq. ft. per standing passenger. In times of rush, the seats do not provide room for additional passengers to sit, and it is in very rare cases only, *i.e.*, when families or friends are travelling together, that the seats accommodate more than the stipulated number of passengers, but in the case of standing room, more and more passengers flock in as the rush increases. The crush capacity of the train is generally taken as 2300 passengers per 2 unit rake, which means that the number of passengers standing goes up from 714 to 1470, reducing the standing space per passenger from about 3 sq. ft. to about $1\frac{1}{2}$ sq. ft. Larger numbers of passengers are also known to be travelling by these trains, and it can safely be stated that during times of rush as many as three passengers stand in the space taken by one sitting passenger. The potentiality of increase in accommodation by reducing the number of seats is amply demonstrated by the analysis given above, and it need hardly be added that if a larger number of passengers is to be carried per train, there is no getting away from the fact that the number of seats provided in the coaches should be reduced in order to provide more room for passengers to stand.

608. The next question that may be considered is the extent to which standing room should be provided on the trains, or, in other words, to what extent should the present seats be removed, and to what extent more room left for standing passengers. This is a matter on which there is considerable divergence of opinion not only in this country amongst the section of people whom we contacted, but also in the different countries of the world. The extreme views naturally are—

(i) to provide sitting accommodation for every passenger that we carry, a view which was forcefully advocated by several representatives of the Passenger Associations.

(ii) to provide only standing accommodation either in the whole train or in certain compartments. The practice is said to be found in Madrid (Spain) where, as reported to us by a witness, he was struck with the ease with which a crowded service was immensely relieved by most passengers remaining standing, a few seats being provided only for the aged, infirm and the ladies. The suggestion to provide standing accommodation only, in some compartments, was also put forward for examination by the Estimates Committee of the Parliament in their report dated 20-12-55 to the Railway Ministry, forwarded to us *vide* Railway Board's No. 82—TG/55/4 dated 27th January, 1956, already quoted in Chapter I.

609. We have carefully considered the *Pros* and *cons* of the extreme views, and are inclined to recommend the adoption of a middle course, by which about half the space is taken up by seats and the balance made available for standing, except in stock employed on short runs, on the Kurla-Mankhurd branch of the Bombay Suburban System (Central Railway) and the Santragachi—Shalimar branch of the Calcutta Suburban System (South Eastern Railway), where standing room only should be provided. The adoption of this practice will considerably increase the carrying capacity on the steam trains, where, at present, it is limited to the number of seats provided and very little space is available for passengers to stand except on the foot-boards outside the carriages. The proposal will also make for increasing the carrying capacity of the older electrified stock of both the Western and Central Railways, where greater space is taken by the seats, which has resulted in a lower carrying capacity. In the case of the electrified stock of the Metre Gauge section of the Southern Railway also, our proposal will mean considerable increase in the carrying capacity, for the practice there is in line with that in the steam stock, and the compartments are literally filled up with seats.

610. In making the above proposal, we are also guided by the manner in which suburban trains fill up, especially those that run during the rush hours carrying a large proportion of city workers between their homes and the town. With very few exceptions, trains generally

start about a quarter full from their originating stations in the morning and it is not till they are in the last quarter of their journey that they get fairly overcrowded and, similarly, the evening trains are generally overcrowded when leaving the terminus and, by the time they are in the last quarter of their journey, they are only about a quarter full. This fact, borne out by the census figures, has led us to our suggestion regarding distribution of space for seats and for standing.

611. The acceptance of the above suggestion by the travelling public hinges on the provision of suitable hand-hold arrangements, for the convenience of such passengers as have to travel standing in the train. Railways have, in the past, provided several types of arrangements. Judging from what is in use in the latest 12 ft. stock of the electrified railways, the most modern arrangement would appear to be the provision of bars, grip handles and coiled spring hangers with a knob at the end for the passengers to hold on. The last of these arrangements seems fairly expensive, and was found damaged in several cases. Perhaps, repairs to them are not within the capacity of railway workshops and replacement is the only solution. We have no adverse comments to make, if the railways are in a position to provide and maintain this expensive type of hanger. If, on the other hand, cost is a consideration, perhaps something less elaborate and inexpensive in the way of a thick jute rope hanger covered with plastic cloth or leather might be provided, which is both cheap and easy to replace. A knob of some plastic material at the end may make the hanger more hygienic without adding to its cost. Leather straps are both expensive and liable to breakage and theft, and are therefore, not recommended.

612. The Committee would like to observe here that in certain countries there is a system of providing a number of folding seats, intended to be used only when the rush is not great and the journey is long. We are unable to recommend that practice for adoption, for during the morning rush, our trains' do get heavily overcrowded in their last lap; and since it will not be then practicable to fold the seats spread out earlier when the rush was less, there is the danger of unpleasantness arising when passengers on folding seats do not fold the seats and thus even standing room is denied to the later arrivals.

Reduction in the number of Classes of Passengers

613. Suburban trains on the electrified sections have only two classes of passenger accommodation, while on the steam sections three classes of passenger travel are provided. At Madras, where the metre gauge section is electrified and the broad gauge is steam operated, two classes are provided on the former and three on the latter. This requires carriages to be divided into several compartments and causes waste of space on door-ways, lavatories, and partitions, besides an unequal distribution of passengers in the various compartments. Although a single type of accommodation in suburban travel should be the aim in the democratic society of a welfare state, we do not think that the time is yet ripe for the abolition of all classes. We do not see, however, any justification for the existence of three classes on the steam operated sections, and recommend their reduction to two, as on the electrified sections.

We do not see much justification either, for different standards of space for accommodating passengers of the upper and the lower classes, and suggest uniformity in both steam and electric suburban trains. This difference, though small on electric trains, is very marked on steam trains where upper Class compartments are very wasteful of space. For example, a compartment on Rake No. LER-13 on the Howrah Division had 12 first class seats in 103 sq. ft. giving an average of 8½ sq. ft. per seat, while 5 to 6 sq. ft. per first class seat were to be found in several other rakes.

Equitable distribution of accommodation between the Upper and the Lower Classes

614. The proportion of passengers travelling in the upper and the lower classes differs with the particular train and with the time of the day but, despite this variation, it is but reasonable that a certain amount of relationship should exist between the numbers that travel in the two classes and the accommodation provided in the train for the two classes.

On the Western Railway, the number of passengers carried, by classes, is given below:—

Years	Number of Passengers carried		Ratio
	I	III	
1953-1954	6,902,174	146,821,339	1:21
1954-1955	7,323,260	155,618,189	1:21

This gives the approximate ratio of 1 passenger in the upper class to 21 in the third. The ratio of accommodation provided in that Railway's coaches is as follows:—

Old Units	New Units
I : III	I : III
1 : 5	1 : 4·4

In other words, where the ratio of accommodation between the I and III is 1 to 5, the ratio of passengers is 1 to 21. On the Central Railway, the number of passengers carried, by classes, is given below:—

Years	Number of passengers carried		Ratio
	I	III	
1953-1954	5,615,753	138,379,645	1 : 25
1954-1955	5,782,463	144,490,367	1 : 25

This gives an approximate ratio of 1 in the upper class to 25 in the third. The ratio of accommodation provided in that Railway's coaches is as follows:—

10′ old stock.	12′ old stock.	12′ new stock.
I : III	I : III	I : III
1 : 7·5	1 : 6·1	1 : 4·2

On the Southern Railway electrified Metre Gauge section, the number of passengers carried, by classes, is given below:—

Years	Number of passengers carried		Ratio
	I	III	
1953-1954	835,888	24,056,173	1 : 29
1954-1955	896,454	26,442,800	1 : 29

The ratio of I and III class accommodation provided in that Railway's coaches is 1:5·5.

We consider that a more equitable distribution of accommodation between the two classes is called for, which should result in a decrease in the upper class accommodation and an increase in the lower class.

615. Similar analysis for the steam operated sections of Madras and Calcutta railways has not been possible, as there is no uniformity in their rakes nor is the standard of accommodation available for upper class the same on all the rakes working a particular train. This is inevitable when rakes are non-standard and the regular upper class passengers have to trust to their luck as to what accommodation they get on any occasion.

Marking out Upper Class by painting outside with distinctive colour

616. Overcrowding in the upper class, especially on the electrified sections, is often caused by passengers of the lower class getting into the upper class, without realising that it is not the proper compartment for them, as the distinction between the upper and lower classes is not very obvious in the very little time that the passengers get to board the train. There is the added difficulty that the position of the upper class accommodation differs from train to train and even regular travellers cannot station themselves on the platform at the correct place for boarding the upper class when the train arrives. We realise that it is not possible to remarshal or alter the position of upper class accommodation so as to fix its place in the rakes that work on a particular section, but a certain amount of difficulty would be obviated if the upper class accommodation was marked out by painting it on the outside with a distinctive colour which could be readily seen, as the train rolls along the platform. This distinctive colouring will help upper class passengers to move up to the appropriate compartment and enable the passengers intending to travel by the lower class to desist from getting into the upper class.

Reservation of seats, instead of compartments, for Ladies

617. The reservation of compartments for ladies is universal, but there are three exceptions.

(i) the South Eastern Railway suburban sections;

(ii) the broad gauge suburban sections of the Southern Railway; and

(iii) the metre gauge electrified section of the Southern Railway, where the upper class ladies' compartment was thrown open for general use some years ago.

The reservation of compartments for ladies results in unoccupied seats continuing vacant, even when the general compartments are overcrowded. In considering this question, we have to bear in mind that the purdah system has almost disappeared from the country and segregation in separate compartments is hardly justifiable. In fact, ladies seldom travel in solitary compartments if they happen to be unescorted, for they feel it safer to travel in general compartments.

618. In considering the abolition of separate compartments for ladies, two courses suggest themselves to us. The first is to abolish ladies' compartments in upper class only, in the first instance, and to do so in the lower class, when social education advances and sufficient reliance can be placed on the average passenger to vacate his seat in favour of ladies without a railway official having to intervene. The second course would be to abolish all ladies' compartments, but reserve for them a certain number of seats with a separate entrance and exit passage, nearest to those seats, reserved exclusively for the use of ladies. This proposal facilitates the ingress and egress of lady passengers, especially during rush hours, when they might find it most embarrassing to have a jostle in the crowds. We are inclined to recommend the second course, for that seems to give the maximum facilities without waste of seats, as seats not taken up by ladies can be utilized by men. This conditional use may be made known by a suitable notice exhibited conspicuously near the seats.

Removal of partitions between compartments and reduction of lavatory accommodation

619. The reduction in the number of classes and the non-reservation of compartments for ladies will decrease considerably the necessity for separate compartments and enable the removal of partitions. Passengers can then move more freely inside the coach and fill it more evenly. There will be better ventilation and freer blow of breeze and travel in a crowded coach, especially on hot days, will become less of a bugbear.

620. The EMU stock has no lavatory, but there is no uniformity of practice on the suburban trains worked by steam. There are some coaches with no lavatory at all, whereas others, although designed for suburban travel, have several. We consider that lavatories in the steam worked suburban stock should be removed, if, in any special circumstances, like the extended run of suburban stock over non-suburban section, lavatories are necessary, the number should be kept down to an absolute minimum of one or two per coach. The main line standard of a lavatory of a minimum area of 16 sq. ft. for every 20 class III passengers or 12 class I passengers is obviously very wasteful of space on suburban coaches. We would also recommend that such rakes should, as far as practicable, not work in and out of town during the periods when the rush of passengers is intense, and accommodation is most valuable, for the space taken up by lavatories is lost to passengers. Lavatory accommodation is normally available on platforms of suburban stations, but a check should be made to ensure that it is located suitably.

Replacement of existing brake vans on steam trains by shells for multi-purpose usages

621. The brake vans in use on the steam trains are particularly wasteful of space, in so far as suburban passenger traffic is concerned. Only a comparatively few trains have specially designed brake vans; more often than not, it is the main line brake vans which are in use. Such a type of brake van is usually provided with a large Guard's compartment and two luggage compartments, which take up almost half the accommodation of the coach, leaving only the other half for passengers. Since each rake has two brake vans, one at either end, the total loss of passenger accommodation in a rake amounts to one full coach. Suburban trains do not carry much luggage. Nor do they need to carry parcels except in non-rush periods. During non-rush periods, they carry produce which is mostly accompanied by the vendors themselves. In sections where large quantities of produce is carried, special vans are provided.

The most notable example is the Sealdah division of the Eastern Railway, where each train has a complement of two 4-wheelers, one at each end. The number of 4-wheelers, specially equipped for carrying produce, is few, but their place is generally taken by modified motor vans or horse boxes in which sturdy racks are provided. The only means for light and air in such vans is the entrance, while the space taken up by the racks prevents their utilisation by passengers, even if they choose to crowd in them and travel standing.

622. Considering the shunting on suburban trains is bound to cause delay, and extra work, and the requirements of various kinds at different times of the day must be catered for, we recommend that the present brake vans should be replaced by specially equipped vans which should satisfy the following conditions:—

(i) The space for the Guard should be the absolute minimum required.

(ii) One compartment, next to the Guard, should have wide sliding doors, so that it can be used for carriage of parcels during non-rush hours, and occupied by standing passengers during the rush hours. There should be adequate lighting, ventilation and hand-hold arrangements for standing passengers.

(iii) The rest of the coach should have wide doors to enable vendors to get in and out with their wide baskets. Seats in these compartments should only be along the line of windows, with a wide rack running along the length just above the seats. This rack, like the upper berth of an upper class compartment, should be strong enough to be used for the storage of produce. The rest of the space in the compartment should be available for standing passengers, and fitted with hand-hold arrangements. When not required for passengers' use, the floor space can be used for stacking produce carried by vendors.

623. It is reckoned that such coaches, if provided on the suburban trains, will materially add to their carrying capacity, besides serving the different purposes required at different times of the day. Their provision will render the special vendors' vans which we noticed on the Sealdah suburban sections unnecessary, and they could be withdrawn and replaced by an extra coach, thus adding considerably to the carrying capacity. The electrified stock in Bombay approximates very much to the above description, and no changes there are called for. The compartment which the Guard uses is the driving compartment in the rear of the train and it is quite modest in size, and the luggage-cum-vendors' compartment is invariably used by passsengers when there is excessive rush. In a luggage compartment of 121 sq. ft., 60 to 80 passengers are known to be travelling during rush hours.

Augmenting the loads of trains

624. The problem of increasing the loads of trains is beset with difficulties, both on the steam and the electical stock, which are peculiar to each and they will, therefore, be dealt with separately. In the case of the steam trains, the limiting factor is generally the size of the tank engine that hauls the train. Most tank engines are calculated to take only 8 coaches. It is only in very rare cases that an increase in load is considered favourably by the railway administrations as practicable. Where extra trains cannot be introduced for one reason or the other, recourse to increasing the load of the train becomes an imperative necessity and this can be done in two ways:—

(i) by utilising a non-tank engine of higher motive power,

(ii) by providing an engine at either end of the train, facing in opposite directions, to enable it to work much in the same way as the EMU stock works.

625. The hauling of suburban trains by engines other than tank engines is looked upon with disfavour, because it is tacitly assumed that a suburban train returns directly it reaches its destination, and if it has to do so, the most expeditions way is to transfer the engine from one end to the other in the least possible time. Our analysis of trains terminating at Howrah and Sealdah clearly brought out that the rakes of a large number of trains that arrived at these termini during the rush hours did not return as trains, but were shunted into the stabling sidings close by, for use during the return rush period. Such a train is eminently suitable for hauling by tender engines, of which the railways hold a very large stock. We, therefore, consider that a number of trains whose rakes do not work a return train immediately during the rush period should have their loads augmented to the capacity of the tender engine that can be found to haul these trains. In the case of trains that return immediately as trains in the reverse direction, we recommend the trial of long rakes with an engine at each end, facing in opposite directions, so that the train can run backwards and forwards *i.e.*, without having to change the staff or the engine. On the very face of it, this appears to be a very wasteful

method of providing transport, but considering that overcrowding takes place only in the immediate vicinity of the terminals, and that for very short periods of an hour or two in the morning and in the evening, we make bold to suggest that a number of such trains should be introduced to ply backwards and forwards within the area of excessive overcrowding, a matter of a few miles at each place.

626. The period for which locomotives will be employed on the trains being strictly limited, not much waste of locomotive power is likely to be involved, if the detentions to locomotives that are kept waiting for trains at present is taken into consideration in any comparison of the merits of this scheme. The advantages of these trains in the matter of saving in yard movements will be dealt with separately under increase in the number of trains, in the following chapter. We visualize that such trains with two engines should be 12 bogies or more, depending on the length of platforms that can be provided for their use in the various sections.

627. The tank engines used on the Southern Railway Broad Gauge are considered by the administration to be capable of hauling 9 bogies, but they work their trains with a load of 7 or 8 bogies on account of the limited capacity of the platforms at Madras Central. This aspect of the question, as given by the administration, was enquired into and it was found that the lines used for dealing with suburban trains were also used for loading motor vehicles, thus taking up a part of the space which would otherwise be available for the trains. It was ascertained that Madras Central was not the only station in the Madras area where loading and unloading of motor vehicles was done, and no justification could be found for taking up platform accommodation at the Central station for this purpose. On the matter being discussed with the railway administration, the General Manager agreed to transfer this work to the other stations in Madras which are close by, and thus permit of the load of trains being increased to the maximum capacity of 9 bogies.

628. Turning to the EMU stock, the problem of increasing the loads of trains is a ticklish one. This stock, on the Broad Gauge, is in units of four coaches and, although single unit trains are in use on the Harbour branch of the Cental Railway, and some other sections, they are not always adequate for the large rush-hour crowds. The 2 unit trains, consisting of 8 coaches, are more in demand, and even they get heavily overcrowded. The old stock on the Bombay railways is nearing the end of its useful life and the driving power available on them is neither sufficient nor reliable enough to carry heavier loads. The new stock, on the other hand, has considerably greater power and is often worked with one motor out of commission. It is, therefore, capable of taking an extra load but suitable trailers will have to be found to hook on. The new stock is of light weight construction, with special non-standard buffing and coupling arrangements, but what makes it entirely different from the other stock in use is the system of brake power, which is pressure actuated instead of the vacuum system in use on the steam train. The design and equipment of special stock to be used as trailers are a prerequisite for the augmentation of the loads of the new stock trains. In this connection, we pursued a line of enquiry under which trailers, which do not have the driving equipment on them, could be made available for more intensive use than the driving coaches, since trailers naturally stay in the shops for a shorter period. Although a certain number of trailers could thus be made available, the number so released will not make any appreciable addition to the stock already available for use. Under the circumstances, and in view of the fact that we are elsewhere suggesting the full utilisation of the fast speeds attainable by the new stock, we are of the opinion that the augmentation of their loads is not worth attempting, except in the case of the Grant Road, Church Gate section, where the line capacity is very heavily taxed. We are of the opinion that, when more stock is available, the question of running 3 unit trains *i. e.*, 12 coaches between Church Gate and Dadar should be considered.

629. In the case of the Metre Gauge electrified section of the Southern Railway, augmentation of the load of a two unit train by an extra coach has been in vogue for many years. The number of such trains, however, is limited to 1 in one direction and 3 in the other. In view of the fact that Madras Beach, Guindy is the more heavily crowded section, we recommend that all double unit trains running during busy periods should have an extra coach in between the units. If necessary, such trains may terminate at Guindy and any passengers bound for destinations beyond transferred to trains that run the whole distance from Madras Beach to Tambaram, Guindy forming the transfer station.

Introduction of Stock specially equipped for suburban travel on the steam sections

630. As has been noticed elsewhere, the stock in use on the steam trains is invariably of the old and obsolete type, very often near the end of its life. Its width is often of the older standards, which considerably reduces its passenger carrying capacity. Considering that the

total stock used on suburban services at Calcutta and Madras is only about 870, out of the total holding of over 7400 on Indian Railways, we focus attention on the desirability of providing high capacity stock on at least some of the trains running during rush hours. We appreciate that the old stock cannot be kept idle or scrapped and has to be put to use, but, in our opinion, there are many other sections of line where the demand for accommodation is not as great as in the suburban sections we are considering, and it will cause no hardship if stock of the persent standard width of 10'-8" is brought in exchange from those sections to serve in the Calcutta and Madras suburban areas. We are aware that the electrification of certain of these suburban sections has been taken in hand, but considering the long time that is likely to elapse before the electrification scheme is completed, we recommend the provision of wider stock on the suburban sections in the meanwhile. Where railways are proposing the provision of new main line stock to make up for the present deficiency of suburban stock, we recommend the utilisation of shells only, after fitting them with a line of seats along the windows and with hand-hold arrangements in the centre so as to enable the bulk of passengers in these coaches to travel standing.

631. There is a general indifference towards providing new and specially equipped stock for suburban lines on the steam operated sections, largely due to the hopes created about the electrification of these sections. We cannot too strongly deprecate this attitude, for even when the sections are electrified, railways should have no difficulty in finding adequate use for such steam suburban stock as is released, in the vicinity of other industrial towns where the necessity of a suburban service is acutely felt. We, therefore, recommend that railways should reconsider their policies, and convert or manufacture suitable stock required for suburban service. The argument that the total requirement of suburban stock on some Railways is small and, therefore, special stock cannot be kept apart for the purpose does not appeal to us, for such stock has to be used exclusively for the suburban services all the year round, and there is no reason why it should not be designed specifically to serve the purpose for which it is meant.

Travel on foot-boards and other precarious positions

632. The prevalance of foot-board travel on a very large scale and the consequent accidents (which are not rare) make us draw particular attention to the importance of providing ample accommodation inside the coach and the removal of handles, foot-boards, and such other fixtures as enable the more adventurous persons to travel in precarious positions on the trains. The new EMU stock on the Bombay railways is devoid of foot-boards and handle bars, and such risky travelling is not possible on those trains. We recommend that the other EMU stock in that area and the steam stock on suburban sections elsewhere should all be stripped of foot-boards and handle bars to the maximum extent practicable in order to discourage the evil practice of foot-board travelling. We emphasize that a pre-requisite to this measure will be the raising of platforms so that passengers can step straight from the platform on to the coach and for this we recommend the fixation of a separate standard height for the platforms on the suburban sections. The raising of platforms will, incidentally, shorten the time passengers take in getting in and out of trains, and will thus be useful in decreasing the stops at the stations and make for a faster and more efficient service. In this connection, we would particularly like to draw attention to the foot rests and handle bars provided, next to the buffers, in the old EMU stock of the Cental Railway, to enable the Railway staff to change the train indicator board on the train. Unfortunately, both these aids, intended for the railway staff, constitute invitations, nay, lures and death-traps to the adventurous but callow youths, especially unwary and unthinking school boys, to ride outside, in preference to travelling on the foot-board or inside the coach. We can see little justification for the retention of the handle bar and foot rest and recommend the early modification of the indicator board mounting, so that the board can be changed from inside the Driver's cab, and the removal of the foot rest and handle bar.

CHAPTER VII

INCREASE IN NUMBER OF TRAINS AS A REMEDIAL MEASURE

Steam operated and electrified sections compared

701. Of the measures required to run more trains on a section, the easiest that readily comes up to one's mind is an increase in the number of rakes and locomotives that are to be detailed to carry the rush traffic, assuming of course that line capacity is available. Though this might be a comparatively simple matter on a steam operated section, where the railways have a large fleet employed elsewhere, such a step is out of the question on electrified sections, because such sections are few and the EMU stocks inadequate.

Examination of electrified sections at Bombay

702. We shall, therefore, begin with an examination of the electrified sections at Bombay to determine whether the existing stock can be put to more intensive use, and thus provide a larger number of trains during the rush hours. The measures that call for attention are:—

(i) Reduction in detention to stock at terminals.

(ii) Reduction of stopping time at intermediate stations.

(iii) Relaxation of speed restrictions at stations and *en route.*

(iv) Running of trains at the fastest practicable speed with a view to reducing running time.

(v) Concentration of EMU stock in the inner suburbs, and making other arrangements for the outer suburbs.

(vi) Running of slow and fast services with facilities for transfer of passengers from one to the other.

Reduction in detention to stock at terminals

703. A study of detentions to rakes at Victoria Terminus indicates that even during the rush period they are held up for ten minutes before they start on the return journey. Halts at Thana, Kalyan and other terminals are equally long, a minimum detention of 10 minutes is apparently the practice on the Central Railway. On the Western Railway, it is four minutes, when the terminating train returns as an empty rake, but 5 to 8 minutes are not uncommon. At Borivli and Andheri, this interval ranges from 6 to 7 minutes while at Bandra during rush hours it varies between 9 and 15 minutes and is longer still at other times.

704. The Committee observed that not more than a minute was needed by the outgoing passengers to detrain at the terminal station, but the subsequent clearance from platform did at times take a longer period, and that affected the minimum time required for returning the rake. The entraining of fresh passengers will take another minute, and trains could be returned in a matter of 3 minutes from a terminal station if conditions were made more favourable. The facilities the committee have in view for reducing the terminal detentions during the rush hours are:—

(i) The manning of EMU stock with two Motormen trained in Guard's duties, one in the driving compartment at each end of the train. This is proposed with a view to obviating the delay that, at present, takes place while the Motorman and the Guard change over from one end of the train to the other, along a heavily overcrowded platform. By only a change of duties and not of men, an EMU train will turn back as quickly as it will move forward, provided, of course, the line is clear.

The employment of overlapping staff is a measure already familiar to the railways, but as practised at present, it is grossly inadequate to the needs of an intensive service, which requires the rapid return of trains, and the running of more trains. It has to be remembered that the present day cost of an 8 coach EMU rake is about Rs. 30 lacs and the railway incurs about Rs. 700 per day towards interest and maintenance charges. Every minute saved during the rush period counts towards enabling the railway to run an extra trip which, under the present methods, can only be done by importing extra rakes.

(ii) To dispense with the cleaning and attention of stock during the two hours of heavy rush so that no delays are incurred on this account. Rakes should be thoroughly inspected and cleaned before the rush hours and should not need further attention for the next 3 hours or so.

(iii) The raising of platforms to facilitate entraining and detraining of passengers. In this connection we would like to invite attention to the fact that whereas the floor level of the coaching stock is 4′ 3″ to 3′ 9″ above the rail level, the standard height for passenger platforms is 2′ 6″ to 2′ 9″. The large difference in the levels does not make for quick entraining or detraining, and in any case requires extra time which would be reduced if the standard height for a suburban platform was fixed higher than the standard for other sections. We realise that this departure means a deviation from the standard dimensions fixed for the railways, but in our opinion, this revision is called for.

(iv) Provision of turn-back facilities and adequate signalling, so that a terminating train if received on the up line may not have to be shunted on to the down line before taking a journey in the reverse direction—Bandra yard is the worst offender in this respect where every terminating train has to be first drawn into a siding and then brought to the platform before passengers can board the outgoing train. There are no less than 15 Western Railway and 48 Central Railway trains, a total of 63 trains terminating at this station and the aggregate effect of detentions to them is certainly considerable.

(v) The quick clearance of passengers form platforms goes a long way towards expeditious return of trains from the terminal stations. To cite an example, we noticed at Victoria Terminus that after passengers had left the train, their dispersal through the ticket barriers retarded their progress as only a limited number are put to use even during the peak rush hours. It appeared to us that the manning of all the barriers during the rush hour would go a long way towards quick clearance of platforms and this could be further facilitated if these barriers were shifted further inside the concourse, to enable passengers detraining to collect opposite the barriers, clear of the platform opposite the train. The suggestion amounts to creating a circulating area between the ticket check posts and the platforms, instead of outside.

Similar remarks apply to Church Gate where clearance from the island platform is retarded by the ticket checking barriers. If these ticket-checking posts could be shifted nearer to the entrances to the concourse, the platform would be cleared quickly and it would be possible to run the train back earlier than is possible now. In the case of other stations where access to platforms is from ramps or overbridges the possibility of widening them or duplicating them needs to be looked into, as quick clearance of platforms is an important factor in the reduction of detention to trains.

Reduction of stopping time at intermediate stations

705. The normal time provided in the time table for halts at a station is not capable of much further reduction, but detention to trains does take place when passengers are no able to detrain or board a train in time. The punctuality figures of the suburban trains are certainly capable of further improvement. A punctual suburban train service is less liable to get overcrowded than a train running late, in which case passengers meant for a later train have to board an already crowded train. Measures like raising the level of platforms, removal of ticket barriers farthest away from the platforms, provision of extra overbridges, or widening them call for a closer sutdy, and to this might be added a further item, the removal of obstructions on platforms, *viz.* vendors' stalls, seats on narrow platforms and such other obstructions as cause congestion and retard free movement of passengers. In our opinion, the space allotted to the vendors should be reduced to a minimum and it should be allotted to them only at places where entraining and detraining of passengers will not be interfered with. Show cases should either be avoided or kept at such a level that platform space is not taken up. Benches, though very desirable for passengers, do become an obstruction where the platforms are narrow, and certainly are not an imperative need where space on the platform is very limited. The worst case that came to our notice was at Charni Road and Marine Lines stations where we noticed benches in the narrowest width of the platform opposite the Booking office, which was under 10 ft.

Relaxation of speed restrictions at stations and en route

706. Speed restrictions affect suburban service in two ways. Firstly a delay to passengers *en route* makes the journey longer and more arduous, which is avoided if these restrictions are kept to the minimum. Secondly the speed restriction affects the turnround time of the stock, preventing the rolling stock from making more trips during the rush hours than it could do if run at a greater speed. The speed restrictions which, for through line running, are not quite so material assume a greater significance in suburban travel and need to be viewed from that angle. For, example, there is a very severe speed restriction for trains between Victoria Terminus and Masjid where a 10 mile speed restriction means a loss of time of 3 minutes for every train. Although the speed restriction extends over more than one signalling section, with adequate overlap and trains can, therefore, follow one another at intervals of 3 minutes, it is not the practice for trains to follow at close intervals. On the matter being pointed out to the administration, they are reviewing the Working Orders and the adjustment of overlaps to see whether any amendments are necessary to enable trains to follow each other at intervals of 3 minutes or less when the speed restriction over the straight is relaxed.

707. The speed restrictions on turn-outs of 10 miles are in force right throughout the suburban section, and although these restrictions are not applicable when runs are on the straight lines, they have a significant effect when trains have to change from one line to the other and the speed restriction becomes applicable. The feasibility of relaxing these speed restrictions by providing split turn-outs needs to be considered, especially at those points where a train in speed has to change over from one section of the line to another and the alternative of making passengers change instead of trains changing from one route to the other is not found practicable. Split turnouts permit of speeds up to 20 or 25 miles per hour and have been tried out on Indian Railways. They seem to be very common on Japanese Railways and deserve more extended use. A study of speed restrictions for various runs is calculated to make for saving in time resulting in intensive use of stock during rush hours.

Running of trains at the fastest practicable speed with a view to reducing the running time

708. Each of the two railways, the Western and the Central have old and new stock, the speed and acceleration characteristics of which differ from each other, as tabluated below:

Characteristics of a 4 coach unit—12′-0″ *EMU stock*

	Old	*New*
1. Motor coaches	1	2
2. Trailers	3	2
3. H. P. of motors	4 × 275 =1100	8 × 175 =1400
4. Acceleration mph/sec.	·9	1·1
5. Length of unit	282′-0	284′-4″
6. Seating accommodation	429	415
7. Crush capacity	724	772
8. Tare weight in tons	196	157·9
9. Maximum speed m. p. h.	48	65
10. Maximum speed w/o Weak Field Tap m. p. h.	40	50

In the table above, the characteristics of the new stock are compared with those of a type of old stock and, although there is great difference between speeds and acceleration characteristics, trains are scheduled to work at a uniform time-table speed of 45 miles per hour. Despite the fact that the Western Railway has six rakes *i.e.*, 12 units, and the Central Railway 8 rakes or 16 units of the new (1951) stock which are capable of much greater speed and acceleration, the railways have provided for indiscriminate use of the stock, as guaranteeing availability of the new stock for particular trains is considered difficult.

709. After having examined the rake working on the two railways and the intensity of traffic during the peak hours, we are of the opinion that these new rakes could and should be worked on separate links so that their availability for particular trains, specially during the

rush hours, can be guaranteed, and trains worked by these rakes during the rush hours be timed to run at the faster speeds, permissible with them. To illustrate the advantage that can be so derived, we should like to mention that the saving in time effected by utilising the maximum power of the train would be of the order of 25% of the running time, and this will enable 5 trains to be run where at present 4 are.

Concentration of EMU stock in the inner suburbs and making other arrangements for the outer suburbs

710. The suburban services of both the Central and Western Railway have progressively extended to outlying areas—Kalyan, Karjat, Kasara on the former and Virar on the latter, and the railways endeavour to carry people from these distant places also on their EMU trains during the rush period despite the fact that this rush period is of about an hour's duration in the morning and of about two in the evening. One of the effects of this extension is that each EMU rake is able to do only one trip during the rush hours and is not able to return in time to do a second, for example, the Western Railway run out a rake to Virar from Church Gate at 17.00 hours and stable it for the night on its arrival at Virar at 18.35 hours. Similarly, the rake leaving Church Gate at 18.35 hours gets stabled at Virar by 20.2 hours. For such trains the EMU stock offers little advantage, as there is no turning back and steam or electric engine hauled trains could do this service between Bombay Central and Virar just as well.

The cases we have chosen are not the only examples. The tables below give several others where a rake does not return to work a train in the rush hours.

Central Railway.

(i) Trains leaving V. T. in the evening rush

Train No.	Time of departure from V. T.	Destination	Time of arrival at destination
K. 61	17·15	Kalyan	18·26
AK. 65	17·35	Ambernath	18·43
NK. 67	17·45	Kasara	20·51
SK. 69	18·00	Karjat	20·02
AK. 71	18·10	Ambernath	19·34
K. 73	18·35	Kalyan	19·55

(ii) Trains arriving V. T. in the morning rush

Train No.	Time of arrival at V.T.	Starting station	Time of departure from Kalyan
XK. 16	9·10	Kalyan	7·50
AK. 10	9·25	Ambernath	8·03
K. 18	9·35	Kalyan	8·20
NK. 8	9·45	Kasara	8·30
SK. 12	9·50	Karjat	8.45
XK. 32	9·55	Kalyan	8·55

Western Railway.

(i) Trains leaving Churchgate in the evening rush

Train No.	Time of departure from Churchgate	Destination	Time of arrival at destination
SW. 173	15·40	Virar	17·23
SW. 185	16·38	,, ...	18·12
SW. 193	17·00	,, ...	18·35
SW. 213	17·52	,, ...	19·20
SW. 225	18·16	,, ...	19·48
SW. 233	18·35	,, ...	20·02
SW. 241	18·55	,, ...	20·23

(ii) Trains arriving Churchgate in the morning rush

Train No.	Time of arrival at Churchgate	Starting station	Time of departure from Virar
SW. 38	7·41	Virar	6·10
SW. 44	8·02	,, ...	6·30
SW. 50	8·23	,, ...	6·58
SW. 68	9·15	,, ...	7·45
SW. 76	9·41	,, ...	8·20
SW. 84	9·58	,, ...	8·35
SW. 92	10·16	,, ...	9·00
SW. 120	11·36	,, ...	10·00

If these trains are worked by Main Line Stock, sufficient EMU stock will be released to perform functions which engine hauled trains cannot do. We shall revert to this aspect later on in the report.

Running of Slow and Fast Services with facilities for transhipment from one to the other

711. The electrified suburban railways of Bombay provide for stopping the majority of the trains at every station. For example, on the Harbour branch, the Mankhurd branch, the Karjat and Kasara sections, every train stops at every station. On the main line sections, however, certain trains skip a few stations on certain portions of their run while they stop at every station in other sections. The object of skipping certain stations appears to be to provide a fast service as also to avoid excessively crowded trains from getting further crowded by the addition of more passengers.

There is, however, another aspect to this question and that is that if certain trains run fast, they can do more trips during the rush period than they do if they have to stop at every station even for a part of their journey. Such an arrangement will enable more trains to be provided during the rush period with the present stock than is done at present. To appreciate this aspect of the question, let us study the running time of trains when they stop at every station and when they run fast stopping at a few stations only on the way. This information is tabulated below:—

Distance.	Section	Slow Runs		Fast Runs		Estimated time for fast run with a minimum no. of stops for 1951 stock
		No. of stops	Time of run in minutes	No. of stops	Time of run in minutes	
33	VT—Kalyan	20	93	3	62	45
21	VT—Thana	14	61	2	39	30
10	VT—Kurla	9	32	1	22	17
6	Churchgate—Dadar	7	21	4	15	12
9	Churchgate—Bandra	10	32	3	22	17
14	Churchgate—Andheri	15	48	5	31	23
21	Churchgare—Borivli	19	67	5	47	31

712. It will be seen from the above that the time taken by stopping trains is very much more than that taken by fast trains, and this time can be brought down to almost half if the 1951 stock is exclusively utilised on the fast runs, making it possible for a fast train to go to its destination and come back in the time that a slow train would take for the outward journey only. In other words, two fast trains can be run with a rake in the same time in which a slow stopping train makes one run. This characteristic of train performance can be most usefully employed at times of rush when passengers in large numbers offer for different destinations so that if fast trains convey these passengers and stop only at a few stations, passengers may either choose the train that stops at their destinations or else travel to the nearest fast stopping station and take a slow stopping train for the short distance from that point to their destination. This arrangement is particularly applicable to the main line sections of the Western and Central Railway, where two Up and two Down lines are available and are utilised for the carriage of suburban traffic during the peak hours. At present, fast trains are diverted on to the through lines only in certain sections, but under the proposal that we put forward, we suggest that during the rush hours the suburban lines should be utilised for trains stopping at every station, while the fast trains should travel over the through lines, thus avoiding their having to take cross-overs, which unnecessarily restricts speeds. The proposal is also calculated to simplify the operation generally and avoid cross movements which, however, well-planned, are fruitful causes of detentions and dislocations.

713. To illustrate the above proposal in a more specific manner, we would suggest that during the rush periods the new EMU stock (1951 design) should be earmarked by railways to run exclusively up to Borivli on the Western Railway, and up to Thana on the Central Railway, using through line tracks, as far as practicable. If the average turn-round time of the stock on these runs is reckoned as one hour, the Western Railway with 5 out of its 6 new rakes could put 5 trips per hour while the Central Railway with 7 out of its 8 new rakes could put 7 trips per hours. This arrangement is calculated to add appreciably to the number of runs that are made under the present time-table. It has to be remembered that, despite the Western and Central Railway using 22 and 20 rakes respectively for their main line services the maximum number of trains, even in the hour of their maximum rush does not exceed 13 and 14 respectively.

We have chosen to illustrate this by assuming the average turn-round time as an hour purely for the sake of simplicity so that when the rush lasts for 2 or 3 hours, these trains can continuously perform this number of trips. In practice, however, the distribution of these trains will have to be determined so as to meet the requirements of traffic whereby some trains will terminate short of Borivli and Thana and thus bring down the average turn-round time to under an hour. Our choice of Borivli and Thana as the limits for these runs is also influenced by the fact that these stations mark the outer limits of the densely crowded sections on the railways where greatest relief is required. No great advantage will accrue if this stock is utilised for longer runs which do not admit of the stock returning in time to do a second trip during the rush hour.

714. Under the arrangement that we have proposed in the foregoing paragraphs for the rush hour periods, the bulk of passengers would be cleared by the fast trains to points nearest to their destinations and naturally these trains, composed of double units, would clear the major proportion of traffic, leaving to the stopping trains the function of distribution of passengers to the less important stations and undertaking short journeys. Such stopping trains, even during the rush hours, could be composed of single units, providing twice as frequent a service as would be possible if each of these rakes was composed of two units. The clearance of passengers could be further increased if single units with standing room only formed the larger proportion on these trains. The inconvenience of standing will be for comparatively short periods and less likely to be resented, as the suggestion is intended to tide over the difficulties brought about by the shortage of stock and the difficulty of its procurement from foreign countries. The old 10 ft. stock of the Central Railway, if denuded of its seats and equipped with adequate hand-hold facilities, would provide adequate capacity for those trains and could be distributed to operate on both the Railways. In making this suggestion for transfer, we have no desire to upset the arrangements for their overhaul which should continue to be done at Kurla shops where staff are used to their maintenance.

715. The method proposed above for the quick clearance of passengers during the rush period is made on a further presumption that passengers on fast trains will be allowed the privilege of travelling up to an adjoining halt even in advance of the destination and to undertake journey to their destination by a return stopping train if it helps them to complete their journey more quickly or comfortably. This arrangements does not involve any extra expense to the Railway, since trains in the direction opposite to the flow of traffic are very sparingly used. Similarly passengers from the smaller stations wanting to catch a fast train should be permitted to travel to a stopping station of the fast train even in the direction opposite to the direction of their journey.

716. The success of the above method of distribution and clearance of passengers during rush period will depend a great deal on the facilities which are made available at the transfer stations for passengers to change from one train to the other. This facility, we are afraid, needs to be greatly improved, as, judged by any standard, it is at present far below the minimum required. The necessity has not been felt or brought home to the administrations because railways have tried to run a train from their principal terminus to every important point obviating the necessity for the passengers to change from one train to the other. For example passengers from Andheri and Bandra coming to Victoria Terminus are provided with trains that originate on the Western Railway, occupy their main lines, and cross over to the Harbour branch of the Central Railway to come to Victoria Terminus. In the reverse direction, these Harbour branch trains have often to wait outside Mahim the junction point of Central and Western Railway, before the Western Railway are in a position to accept these trains on to their main line, causing considerable room for differences of opinion between the two administrations and annoyance to passengers. There being only two lines, one Up and one Down on the Harbour branch, each of the trains on this route with a few exceptions stops at every station, which means that a journey from Bandra to Victoria Terminus takes longer than is performed *via* Dadar. To give an idea of the time taken on a journey from Victoria Terminus to Bandra, the railway time-table puts the journey time as 32 minutes, when the journey performed from Victoria Terminus to Dadar by a fast train would take 13 minutes and that from Dadar to Bandra 8 minutes making a total of 21 minutes. But even with this delay, the Harbour branch trains to and from Bandra are not the less popular.

717. Similarly, Harbour Branch trains are extended to Mankhurd taking 42 minutes on the journey which could be done between Victoria Terminus and Kurla by a fast train in 22 minutes plus 12 minutes for a stopping train from Kurla to Mankhurd making a total of 34 minutes against 42 minutes now taken.

718. The Central Railway runs trains to and from Thana, a station on the main suburban line, both by the main suburban line and by the Harbour branch. A train stopping at every station on the Harbour branch and on the section Kurla to Thana does the run in an hour, which could be done by a fast train on the main line in a matter of 33 minutes.

It has to be pointed out, in this context, that every harbour branch train to or from Thana has to cross the through line at Kurla, when leaving or entering that station, in order to move to or from the main suburban line, as the through line is not provided with platform at the stations between Ghatkopar and Thana, and consequently both Up and Down main suburban line traffic *via* the main suburban line and the traffic *via* through line are blocked every time such passage is effected.

We should like to draw attention to an aspect of suburban train working in our country, where it has become the rule rather than the exception to run direct trains to each destination, without even requiring the suburban traveller to change trains *en route*. Even though a passenger on suburban trains is seldom encumbered with luggage, and is in a position to change trains, Indian Railways are required to and do run trains to diffierent destinations without a change *en route*, which complicates yard and train working and leads to delay and dislocation. Our individual and personal experience of long past in Paris and London leads us to think that this was not the case there and passengers freely changed trains from one route to the other, thereby simplifying train operation. In fact, one of us was particularly struck by a route indicator board provided at all stations on the Paris Suburban Railways, whereby any passenger could find out the transfer stations and the routes he was to follow to reach any station that happened to be his destination by pressing a button when the transfer stations and the route he was to take were lighted. To corroborate the existence of the practice of passengers changing trains at transfer points we consulted the Time Table of the ILLINOIS Central Suburban Section, Chicago, and found that they have transfer stations where connecting trains are provided for passengers to carry them to their destinations on the branches. The practice of requiring passengers to change trains is also evident from a study of the Pennsylvania Railroads Report kindly lent to us by Mr. L. A. Natesan, Economic Adviser, Railway Board, which shows that, on a 27½ mile section from Philadelphia to West Chester, passengers have to change at Media, a station 14 miles away. Similarly on their main line suburban section between Philadelphia and Paoli, a stretch of 20 miles, a more intensive service is run up to Bryn Mawr, a distance of 10 miles, where passengers have to change if they have to proceed further. We consider that the same practice should be *gradually* introduced on the suburban sections of Bombay and Calcutta and transfer stations should be suitably equipped to facilitate transfer of passengers.

Procurement of additional EMU stocks

719. Coming now to the question of additional stock for catering for the increased traffic, it has to be borne in mind that the suburban traffic has increased considerably, during the war and the postwar years, and the following figures bear testimony to the need for increased stock:—

SUBURBAN TRAFFIC

(In millions.)

Year	BROAD GAUGE		METRE GAUGE
	Central Railway	Western Railway	Southern Railway
	Number of passengers	Number of passengers	Number of passengers
1938-39	33·6	47·6	8·49
1939-40	33·9	48·3	8·50
1940-41	36·4	51·1	8·65
1941-42	45·4	59·7	9·68
1942-43	52·4	64·2	13·0
1943-44	70·0	84·3	16·5
1944-45	86·1	100·4	20·8
1945-46	98·0	112·1	25·4
1946-47	97·8	113·7	24·4
1947-48	108·0	128·1	28·7
1948-49	129·9	135·1	27·4
1949-50	143·8	149·8	28·7
1950-51	149·8	157·5	30·7
1951-52	147·0	145·4	28·0
1952-53	147·8	149·4	25·9
1953-54	144·0	153·7	24·9
1954-55	150·3	162·9	27·3

720. There is no denial that the standard of comfort available to suburban passengers has materially deteriorated with the overcrowding and, even though there may be differences of opinion as to whether suburban traffic in the future will increase, remain constant, or go down, there can be no difference of opinion on the question of the standard of comfort which a suburban passenger is entitled to. The stock ordered for the Railways in 1951 and afterwards bear testimony to the fact that the Railways are alive to the necessity of providing a better standard of seating accommodation, better lighting, and other conveniences, so that, even if our traffic does not increase, the case for increased stock to carry a lesser number of passengers per train than the present marked carrying capacity and with greater comfort is beyond controversy. Additional EMU stock is on order, 174 coaches or 42 units for the Bombay Railways and 24 coaches for 6 units for the Southern Railway, and more and more will have to be ordered to find replacements for worn out stock and for carrying the increased traffic. In view, however, of the fact that this country does not manufacture such stock, and has only recently started assembling it, we refrain from stressing the necessity of making up the arrears all at once, as such a course would entail heavy imports of material which may not be up to proper standard and may reveal defects of design and construction which can only be determined after a long trial. We, therefore, appreciate the cautious attitude of the Railway Ministry in holding their hands, till they have tested the performance of the firms, with whom orders have been placed, and repeating or issuing fresh orders, only when they are convinced that the supplies are satisfactory. We, however, stress that it is high time that the Government decided on its standard designs for this type of stock, and having fixed them, developed indigenous resources to supply the future needs of the railways, on a programme basis, at as early a date as possible.

Supplementing EMU stock service with other types of service

721. It follows from the review of the position of supply of stock as given above, that for some time to come, railways will have to resort to supplementing the service maintained by the EMU stock with other types, during the rush hours. This, in our opinion, can best be done by concentrating the EMU stock within the inner suburbs and detailing ordinary stock for dealing with the outer regions and for supplementing the suburban services, as a whole, during rush periods, with fast trains on the through line stopping at all stations in the outer suburbs and at important stations only in the inner suburbs. In this connection, we should like to emphasise that electric traction with EMU stock has two advantages over the steam stock—

(i) that it has quick acceleration and, therefore, gives a fast service, where the stops are frequent and at close intervals, and

(ii) it provides arrangements for driving at either end of the train which obviates the necessity of having to transfer the locomotive from one end of the train to the other.

None of these requirements is essential for trains which are run over comparatively long distances and with few stops *en route* and are not required, from the point of view of traffic, to work back as trains immediately *e.g.*, trains from Victoria Terminus to Karjat and Kasara and some trains to Kalyan and trains from Church Gate to Virar. Instances of half a dozen such trains, each way, during rush hours on the Western and Central Railways have already been given in paragraph 710 and if these trains are composed of ordinary stock suitably modified for suburban service and hauled by locomotives, electrical, diesel or steam—the EMU stock could be more usefully employed in reducing excessive overcrowding where the traffic is dense. As a matter of fact, the Central Railway runs one such train, AK.20, with main line stock and if this practice is followed in respect of other trains, EMU stock, in appreciable quantities, can be released to work the stopping trains in the inner suburbs, where overcrowding is at its maximum.

722. The above suggestion of replacing trains at present run with EMU stock by engine hauled trains raises issues which we shall briefly touch upon here. These are—

(i) Terminal Platform facilities and turning round of locos.

(ii) Speeds.

(iii) Costs of stock and its availability.

Terminal Facilities

723. Perhaps, the first reaction against the use of engine hauled stock is the lack of platform facilities at the terminal stations at Victoria Terminus and Church Gate. Victoria Terminus, in its suburban station, has 8 platforms, whose usage has been described in paragraph 251. The two Harbour branch platforms deal with 9·5 trains per platform hour, while Main

Suburban line platforms deal with 4·6 trains only. We think that 3 platforms for main suburban line EMU trains ought to be ample, leaving 3 platforms for use of engine hauled trains. We do not think that any difficulty should be occasioned in dealing with 6 such trains during the evening or morning rush on 3 platforms, which are available at Victoria Terminus.

724. With regard to running trains on the Western Railway Main lines, our initial difficulty is the non-existence of through lines running into Churchgate and the lack of facilities at that station. The first difficulty is proposed to be got over by reserving the Churchgate—Bombay Central section for fast trains only, during the rush periods, and limiting the stopping trains to ply beyond Bombay Central. The second can be got over if only the yard alterations contemplated in the proposed rebuilding of Churchgate station are executed early and stabling sidings with run-round facilities provided. These need not wait for the construction of the station building. Once the sidings are laid, engine hauled trains can be dealt with. If, however, our scheme of running engine hauled trains is accepted, we would suggest that additional stabling lines be provided at Churchgate on land to be acquired by the side of the proposed sidings and that in the case of outward rush, the engine hauled trains need not start from Churchgate but from Marine Lines to reduce shunting movements. It might be noted that traffic to and from Marine Lines is very heavy and the proposal of these trains not starting from Churchgate will not be any great hardship, specially when the frequency of service will be appreciably greater and these trains will be few. In fact, we think it might even be practicable for some of the trains running in quick succession to skip one or two stations between Churchgate and Bombay Central and thus save time and increase capacity of the section. Till such time as terminal facilities at Churchgate are extended, relief might be confined to the section Dadar to Virar where engine hauled trains can operate on the main lines while EMU stock operates on the suburban lines. In that event, many fast trains will have to be introduced between Churchgate and Dadar and passengers will have to transfer to these fast trains at Dadar. We realize that this will mean an additional change with its consequent inconvenience but in our opinion, even this will be an improvement over the present condition of packed trains.

Speed

725. Coming now to the question of speeds, we are unable to see any appreciable difference between speeds attained by engine hauled and EMU stock in the case of trains that do not make frequent stops. The speeds attained by the steam trains of the Western Railway up to Virar are not very different from those by the EMU trains, if the long halts of main line trains are reduced and brought in line with the requirements of the suburban service.

Cost of stock and its availability

726. The present cost of a third class all-steel coach HAL design is of the order of 1·28 lacs, which means 10·24 lacs for 8 coaches. The cost of locomotives is understood to be as follows:—

Electric loco ordered in England	£ 61,945 f.o.b.
Electric loco ordered as a trial on Japan	£ 42,800
Steam locos—WM	£ 17,065 f.o.b.
Steam locos—WL	£ 32,327 f.o.b.

Allowing for customs duties and freight charges, a locomotive may be said to cost between 3 to 10 lacs so that the cost of train with 8 all-steel coaches and engines will be beween 13 and 20 lacs depending on the kind of locomotives. The cost of an EMU 8-coach rake, we are told, is about 30 lacs.

727. It will be seen from the above that as far as initial costs go, the engine hauled train is by far the less expensive. The fact that coaches are manufactured in the country in large numbers makes it an easier proposition to get this stock than the EMU. With regard to the availability of electric locos, we are told that the Western Railway has none, while, what the Central Railway have are insufficient to meet their other demands, especially as they are having difficulty with the procurement of spares. We are, however, led to believe that purchase of new electric locomotives is a simple matter and their supplies can be made in a much shorter period than for EMU stock. We, therefore, suggest examination of the question of procurement of electirc locomotives to run these fast trains. This suggestion is made on the additional consideration that, during slack periods, railways will be able to find other uses

for these electric locomotives but not for EMU stock which must necessarily be stabled. We should not be misunderstood to be recommending the use of engine hauled trains in preference to EMU stock, when the latter is available, but we have gone to the length of advocating the use of engine hauled trains, till our country is in a position to build EMU stock and we have adequate supplies of it.

Electrified section on Southern Railway

728. Let us next consider the electrified section of the metre gauge on the Southern Railway. There, for years, the deficiency of EMU stock has been felt, and endeavours made to make it up by attaching ordinary coaches in between two units of the electrified stock. Twenty-four coaches of EMU stock for this Railway are on order, and in fact are expected any day. When these are introduced into service and the measures suggested by us for increasing the capacity of the trains implemented, overcrowding on the trains should materially decrease. We expect that a number of single unit trains, especially in the section Guindy to Madras Beach, would be replaced by double unit trains of a much larger carrying capacity and reinforced with a bogie third in between the units of every train, and this should ease the position.

729. The frequency of service at present attained is only 9 trains per hour, some of which run at intervals of 5 minutes others at 8 minutes or longer intervals. With the availability of stock, more trains can be run, but the level crossings, a large number of which exist on this section both within the city area and outside it, are bound adversely to affect the punctuality of this train service as also to create road blocks which will give cause for complaints from road users. We consider that the problem of level crossings should be tackled—

(i) by improving them,

(ii) by acquiring, before the areas get built on, sufficient land in the vicinity to be able to replace them by over or under bridges, as and when funds become available.

Our observations with regard to the nature of improvements and the organization necessary there, for effectively carrying them out, are included in *Appendix X.*

730. A shortage of EMU stock can only be made up by running additional steam or electric loco hauled trains. In our opinion, the arrangements for dealing with such trains at Beach, Egmore and Tambaram are capable of considerable improvement, and if the improvements detailed below are implemented, it should be possible for these trains to cause less dislocation to the electrical service, even if their number is added to.

731. Steam trains running from Tambaram to Madras Beach are at present received at Egmore station on the electrified line. This means that electric trains cannot be received at Egmore station at the same time, nor can they follow the steam train in quick succession, as the former train will first have to come to Egmore station, stop there, and then only can follow the steam train (which precedes it). We are unable to appreciate the point of receiving the steam train on the electrified line at Egmore station and consider that it should be received on the platform line in the non-electrified portion of the yard nearest to the electrified lines. This line happens to be a dead end which is capable of being extended and joined to the electrified line at the Madras Beach end, thus enabling direct despatch of trains from this line to Madras Beach. With the connection made at Egmore station as described above, the operation of electric trains will not be dislocated, when the steam train is not able to keep its time. All that would be necessary, in the event of the steam train running late, is to control it and to let it into the section Madras Egmore to Beach as soon as the line is available. Similarly, in the reverse direction, the steam train will clear the electrified section directly it arrives at Egmore, and the flow of electric train services will not be affected directly the steam train has cleared this new junction.

732. The arrangements for dealing with the steam trains at Madras Beach are equally unsatisfactory. When a steam train or electric locomotive hauled train is received at Madras Beach, it has to be backed into the stabling yard to release the engine. The engine then has to be run round, the rake has to be backed on to the platform and then only the train can restart. The working of an engine hauled train differs from that of the EMU stock inasmuch as the engine has to be run round and arrangements for its escape have to be separately provided. These do not exist in the electrified yard and, therefore, receipt and despatch of engine hauled trains causes congestion there.

733. Considering that there is plenty of space at the Beach station to admit of necessary platform and run round line facilities being provided, we recommend that these facilities for the reception, despatch and stabling of trains run by steam or electrical locomotive should be provided alongside the electrified yard, shifting the broad gauge platform further out as necessary. In our opinion, this facility should be provided even though the main line between Egmore and Tambaram is down for electrification, as limitations of EMU stock are bound to require steam or electric locomotive hauled trains to be worked into Beach station in times of unusual rush. We also consider that greater facilities for shunting of rakes should be made available at Beach station, without restricting the receipt or despatch of trains on and from platform lines not involved in the shunting operation. This is necessary, as rakes have often to be split or added to at this station and it is undesirable for this operation to affect reception or despatch of trains. Facilities for quick run round of electric locomotives at Tambaram also need to be provided.

734. If the arrangements that we have recommended at Egmore, Beach and Tambaram are provided, it should be possible to supplement the EMU trains by electric locomotive hauled and steam trains up to the maximum capacity of the section, which in our opinion would be 12 per hour. This capacity ought to be enough for some time to come, provided the trains run are of sufficient capacity. We consider that every EMU rake run during rush hours on the section Beach—Guindy should be composed of double units with a third class bogie in between, which is not so at present in several cases.

735. We also consider that the number of EMU trains run out of Beach during rush hours should not be less than 7 per hour. This is based on the Railway's estimate of turn-round time of 100′, which for 12 rakes will give $\frac{12 \times 60}{100} = 7.2$ trips per hour. We reckon on 12 rakes to be made, 6 of single units and 6 of double units with a third class carriage in between, to be formed out of the 18 units made available to traffic. Since Guindy is half way between Beach and Tambaram, we do not see any difficulty in ensuring that each train running between Beach and Guindy has a second unit and a third class carriage while only single unit trains run between Guindy and Tambaram. If this involves speeding up of trains slightly, that might be done by skipping some stations, specially, when trains will be running at 5′ interval instead of 8′ as at present.

736. With regard to supplementing the EMU trains by others, we consider that since 3 electric locomotives are made available to traffic, it should be possible for the railway to run out at least 3 electric loco hauled trains during each rush period in the morning and evening. At present, there is only one EG hauled train arriving Beach between 9 and 10 while in the reverse direction there are two, one between 17 and 18 hours and another between 18 and 19 hours. This number would become capable of going up to 3 in any rush period, especially when terminal facilities as suggested by us are provided. If the evening rush extends beyond 1 hour and 40 minutes, a larger number of trains of this type can be provided during that period. If to the above are added the two steam trains that run to Beach in the morning and return in the evening, we could have almost 12 trains per hour during the rush periods.

737. We should here like to draw attention to an aspect of working of the two steam trains running into and out of Madras Beach during rush hours and that is that they run through between Tambaram and Egmore, despite the fact that the number of passengers on them is below their carrying capacity. From the census figures of 28-11-1955 (Monday) given to us, it is observed that whereas the marked seating capacity is above 400, the number of persons in the trains was 359 and 342 in trains Nos. 642 and 646, when leaving Tambaram, and 241 and 279 in trains Nos. 647 and 641, when leaving Madras Egmore. We suggest these trains making a few stops on the run between Tambaram and Madras Egmore to carry a fairer share of passengers. If this involves provision of island platforms along the steam lines, we recommend their provision at certain stations at least.

Steam Sections

738. The frequency of service on the steam sections is generally not limited by the capacity of the line; but, the factors that limit the Railways putting in more trains generally are the deficiency of stock, tank engines and the terminal facilities in the yards at Howrah, Sealdah and Madras Central. We have assumed in the above statement that line capacity beyond the terminals is available on all sections and even though this view may not be entirely correct, by and large, this is the position. Where, on any special section the sectional line capacity is limited, steps to improve it are well within the means of the railway administration, be that the splitting up of the block section by providing a block hut or reducing

its length by the provision of Intermediate Block Signals, as provided for in Section E, page 70, of the Draft General Rules. In cases where adequate capacity is not available even with the above measures, Automatic Block Signalling would provide the necessary capacity. In the case of single lines or double line sections where tracks are gauntletted, capacity can be increased if trains in the direction of rush of traffic run in a flow and get precedence over trains in the other direction which are lightly packed. For example, trains proceeding to Calcutta in the morning ought to get preference over trains in the other direction at stations of crossing, while in the evening it ought to be the other way about whereby trains running out from Calcutta will get a clear passage by making trains running towards Calcutta wait at crossing stations, even though it involves greater delay to the lightly loaded trains.

739. The requirements of coaching stock in the steam opertated sections fall under three headings;

(i) Exchange of present stock with properly equipped suburban stock.

(ii) Making up shortages in train compositions or adding to their strength where rake composition is below the hauling capacity of the locomotives employed.

(iii) Stock for additional trains.

The total number of coaches at present employed on steam trains in only about 870, whereas the holding of broad gauge stock by Indian Railway is about 7,400. Besides, it is understood that Railway Workshops are equipped to alter and manufacture large quantities of stock, while manufacturing concerns build a few hundred new coaches every year. Under these circumstances, it should not be a difficult matter for railways to attend to items (i) and (ii) above, once the importance of this aspect is brought home to them. With regard to stock for additional trains, our recommendations on the steam sections are to make greater use of the existing rakes which block the main terminals and practically no extra rakes will be required then under this head. This remark, however, does not apply to the electrified sections in Bombay where we have suggested use of Main line stock to run long distance trains now run with EMU where, of course, additional stock will be necessary, unless main line rakes can be spared to work these trains in the intervals of their normal runs.

740. Let us next examine the position with regard to tank engines that are required and employed on the suburban services in Calcutta and Madras. The number in use is 126 out of 747 tank engines which the Indian Railways possess. We have not examined whether tank engines employed outside these regions are fully utilised or can be transferred to the suburban services in the regions under our consideration. Assuming for the time being that none of them can be spared, we shall examine how far other types of engines can be utilised for working the suburban trains during the peak periods. We gather from the memoranda received from the Railways (and this was the general opinion of most of the railways' representatives with whom we discussed this matter) that the paucity of tank engines prevents them from putting in more trains and we, therefore, concentrated on examining whether tender engines could not work some of the rush hour trains. Our enquiries elicited that quite a good few of the trains that terminate in the morning during the rush hours do not return as trains till the evening rush, some six to eight hours later. For example, on the South Eastern Railway, the rakes of the following trains that arrive at Howrah do not work back as a train immediately but are stabled at Santragachi (STC) to work a train in the evening as detailed below:—

1. Rake of S. 6 arriving Howrah at 8-12 returns to Santragachi and is brought back to Howrah to run as S. 13 at 19-20 hours to Deulti (DTE) where it is stabled for the night.
2. Rake of S. 16 arriving Howrah at 9-26 returns to Santragachi and is brought back to Howrah to run as 355 Up at 17-40 hours to Midnapore (MDN).
3. Rake of S. 10 arriving Howrah at 9.43 returns to Santragachi and is brought back to Howrah to run as S. 7 at 18-05 hours to Machada where it stables for the night.

Similarly trains that leave these stations in the evening are not worked back immediately as trains from their terminals and it, therefore, follows that a number of these trains can be worked by tender engines, only if the railway administrations are prepared to run these tender engines to the next shed where they can be turned and sent back to work the return train several hours later. In other words, with a little less economical working, it is not beyond the capacity of the railways to provide more and heavier trains hauled by tender engines to relieve overcrowding.

741. Conditions on the Southern Railway broad gauge are not dissimilar to those on the South Eastern Railway, and it should not be difficult for that railway to run its trains with tender engines if necessary. Judging from the extent of overcrowding, we did not see that

they have a case for running more trains at present, and, therefore, we have not dilated on this point. In the case of the Eastern Railway, tender engines are in use in a number of cases, as out of the 143 engines that they use for their suburban services, only 84 are tank engines, while 59 are tender engines. The scope for more extensive use of tender engines on the Eastern Railway is there, and non-availability of tank engines need not deter them from putting in more trains or increasing the carrying capacity to the extent the tender engine employed can haul.

742. The next limitation we have to consider is the capacity of the terminal yards to receive or despatch more trains during the rush period. This limitation, our examination revealed, was not due to the lack of platform facilities, but due to the several movements which every terminating train caused in the shunting of the rake on to the stabling sidings, and the transfer of the locomotive from the platform line to the loco shed. The table below gives details of movements in the Howrah yard during the morning rush period. The time of arrival of the train, time of its shunting to the stabling siding called the Jheel siding, and the time of the movement of the engine to the loco shed have been given in each case. It will be seen from this table that rakes remain stabled at the platforms for periods ranging from 12 minutes to over an hour which is in sharp contrast with the practice of the EMU trains which are capable of returning within 3 or 4 minutes. With regard to the platform, it must be remembered that passengers vacate these trains in almost a minute, and these trains do not carry luggage or parcels so that from the working point of view they should be free to work back as trains in a matter of a few minutes. If we look at the detention to the locomotives, the picture which we have presented brings out that, except in one case where the engine left for the shed in 13 minutes in all others the period was about half an hour going up to an hour.

Train No.	Plat-form	Arr.	Time of shunting to Jheel siding	Time of occupa-tion of platform	Time of shunting to Loco shed	Remarks	Detention to Loco, till the time it leaves for shed
S. 152	0	8-0	8-15	15′	8-27		27′
S. 130	1	8-7	8-20	13′	8-32		25′
S. 154	4	8-22	..	..	..		
S. 118	0	8-30	8-45	15′	8-55	From S/Line to. shed at 9-4.	34′
S. 132	1	8-36	8-50	14′	8-58		22′
S. 104	5	8-42	..	..	9-42	Reversed from 5 to 6 PF and sent to shed at 9-45	63′
S. 156	3	8-48	9-00	12′	..		
S. 94	0	8-54	9-07	13′	..		
S. 158	2	9-03	..	..	9-09	Reversed from 2 to 1 and to shed at 9-14	13′
S. 106	6	9-12	9-40	28′	9-45		33′
S. 160	1	9-17	9-32	15′	9-43		26′
S. 120	3	9-24	9-38	14′	9-45	To S/Line and then to shed at 9-50.	26′
S. 134	0	9-30	9-47	17′	10-00		30′
S. 96	1	9-31	..	..	12-00		41′
S. 108	2	9-42	10-25	43′	10-00	Engine reversed from 2 to 1 and to shed at 10-16	34′
S. 146	3	9-45	10-08	23′	10-15		30′
S. 162	0	9-56	11-00	64′	10-52		56′

Since these movements prevent receipt or despatch of more trains, the obvious remedy is to run these rakes back as trains eliminating the shunting, which the termination of the train involves, and providing more trains. In other words, if the train that are received during the rush hours return immediately as trains in the reverse direction, the yard movements get simplified and the same terminal becomes capable of handling twice that number of trains during the period. For this purpose, it is necessary to work trains somewhat on the lines of the EMU stock, which can be driven from each end. On a steam train, it is necessary to attach two locomotives to it, one at each end, facing in opposite dirernctions, so that the train can be driven in whichever direction it is required to be worked. This, to our minds, is the solution to the problem of limited terminal facilities at Howrah and Sealdah, which are down for electrification in the near future, and have to be worked to their utmost capacity. We grant that the method proposed looks expensive in operating costs, but we feel that, in practice, it will not prove to be so, since it does not involve any large capital outlay and is only an expedient for the interim period. Since these trains could be longer, say of 12 bogies instead of the normal 8,and will be capable of performing many more runs,the expenditure for the traffic that these trains will move will work out to be not much higher than on the normal steam train, whose engine has to spend a lot of time in running to and from the shed and waiting for, and while on the train. In considering this proposal, one must not lose sight of the fact that the rush periods do not in the aggregate amount to more than 4 hours in a day, and this system of train working is advocated only for this period and for trains shuttling backwards and forwards, in the inner suburbs, a distance not exceeding 15 miles where the overcrowding is the heaviest.

743. We observed on the Eastern Railway that one of the limiting factors in the running out of additional trains in the evening was the placing of rakes on platforms. The shunting locomotives are of poor capacity and the shunting movements that we witnessed were extremely slow. It appears to us that considerable improvement can be effected by the use of greater capacity shunting locomotives and by employing train engines to push their rakes to the platforms from the stabling yards. What we visualize in the case of the last suggestion is that a set of 4 or 5 locomotives should come out of the shed and be taken on to the stabling lines, where they will attach to their rakes and back them on to the departure lines, one after the other, something like what happens on a hump yard. In such a case, all movements, will be in one direction and if suitable signalling arrangements are made, it should be possible to direct the movements of rakes from the stabling yard to the departure yard one after the other in quick succession. If the system is found to be workable, it would be advisable to so alter the departure times of trains that they leave in quick succession for an interval and then have sufficient gaps to enable several rakes to be thus shunted from the stabling yard on to departure lines. The stabling yard in Sealdah is admirably suited to this method of working, but in Howrah yard, there is the difficulty of the Jheel siding accommodating two rakes in each line, and being made up of dead ends which are not gathered on to the other side to enable engines to be attached in the correct position. Howrah yard is the midst of a change and alterations to the stabling lines there would perhaps be not justified, until the method is tried out in Sealdah and worked successfully.

744. Although Railways regard Howrah and Sealdah stations as being worked up to their maximum capacity, our examination convinces us that Sealdah (South), even under present methods of working, is not. With the facilities available in that yard, there is room to put in 2 or 3 extra trains, both in the morning and the evening rush periods, without even resorting to the methods advocated above.

CHAPTER VIII

OTHER GENERAL AND SPECIFIC REMEDIAL MEASURES

Space-Time-Speed Studies

801. We have, in an earlier Chapter*, referred to the necessity of space-time-speed studies with a view to having reliable data for checking up the requirements of the traffic and the provision of necessary facilities. Perhaps, a particular example or two will help to illustrate and emphasize their importance. First we shall take for instance, the correct estimation of time on entraining and detraining of large numbers of passengers in relation to platforms of different heights. On the Western Railway at Churchgate a 3 minutes service is considered feasible by the authorities, only if passengers can be educated to entrain and detrain from trains within this time, and if additional platforms are provided. We quote here the words used by the Railway administration in their No. T. 50/2, dated 28-12-55 to the Railway Board which are as follows:—

> "During the peak hours at Churchgate station there is very heavy traffic getting out from the trains and a large number of passengers also entrain at this time, going from Churchgate to the important suburbs. At present they are taking more than 3 minutes. No test has been made whether the public would be able to entrain and detrain within the time limit. This is a matter of education and it will take some time before the passengers are educated to take the least possible time in detraining and entraining. In the circumstances, the present estimate of whether it is possible to run trains with a headway of 3 minutes has to be an assumption at present."

Our observations at this station led us to believe that quicker detraining and entraining can be facilitated by—

(i) increasing the number of exits and locating them in such a manner as to have a circulating area between them and the platforms. Incoming passengers can then detrain immediately the train comes to a stand and move into the circulating area instead of being held up in the train or on the platform;

(ii) increasing the platform heights to correspond with the floor level of the coaching stock.

Not only will a higher platform help the aged and the infirm who might have to make special effort to climb or dismount a rise or fall of one foot or more at entrances to carriages which are meant to oversail platforms built to standards suitable for 10 ft. wide stock, but also the other passengers behind and impeded by them. In the absence of accurately collected data, it becomes purely a matter of opinion as to whether the design of circulating areas, width of platforms and the position of ticket barriers should be altered in the projected alterations or not, and whether departures from standard heights of platforms to suit the specific need of 12′ wide suburban stock will confer an operating advantage. It has to be borne in mind that whereas the Railways' main line standard stock is 10′-8″wide for which a platform wall 5′-6″ away from the centre of track 2′-9″high is prescribed and considered reasonable for main line trains that halt at stations for comparatively longer periods, the same distance and height of wall are unsuitable for suburban stock whose standard width is fixed at 12′ and which has to oversail such platforms. It is true that no platform wall should be so built as will not permit of either stock being brought against them but where the stock in use is only 12′ wide suburban stock as at Churchgate there seems no reason why the platforms should not be say 3′ 6″ high and built about 6′ away from the centre of track so as to enable passengers to get in and out with the minimum of effort and with the maximum speed.

802. It has be to realized that if separate standards are necessary for the width of suburban stock, there is every reason to have structures and platforms to suit them specially where main line stock seldom operates as at Churchgate or the suburban station of Victoria Terminus which thousands of passengers use every day. Such platforms will not preclude main line stock being brought opposite to them but will leave a gap between the wall and the carriage door which may not be quite desirable in daily use. The collection of data in respect of each movement in different circumstances enables Railways to base their decisions on it instead of on presumptions.

---

* Chapter I, Paragraph 112.

803. The next aspect of study might concern itself with the effect of obstructions on platforms which retard the flow of passengers and adversely affect the punctuality of trains. Vendors' stalls and benches, however desirable, impede movement on platforms which, even otherwise, are none too wide. Dadar, for example, receives 700 or more passengers from a passing suburban train and an equal number get into the same train whose halt has to be kept to the absolute minimum. The speed of movements of such masses requires careful study and it is in this context that the effect of stalls and benches on the platform which is none too wide has to be studied and the desirablity of their shift to places where they do not adversely affect operation considered.

804. Equally important is the time study on movements over steps or ramps leading on to overbridges in order to determine whether their speeding up does not warrant the provision of escalators for the large mass of humanity that has to change over from platform to platform without undue strain or loss of time. On the successful solution of such problems depends the success of transfer stations which, in our opinion, are necessary to ensure the most efficient use of stock. It will be recalled that we have expressed it as our opinion that, if separate trains are run on separate sections, much more intensive use can be made of the available stock. Single units can run if necessary more frequently over the sparsely used sections while double units operate on the densely occupied sections. Almost every suburban area has marked sections over which traffic can be so divided. Guindy marks the limits between the two sections on the Madras Beach—Tambaram section while Andheri or possibly Jogeshwari and Thana represent similar points on the Bombay suburban sections. We consider that space-time-speed studies will be very helpful in developing proper data for the determination of such controversial issues as to whether passengers should change or trains should be taken through.

805. In the matter of statistical data regarding passenger movements, we made reference in Chapter I to the necessity of determination of the average number of trips undertaken per season ticket, so as to appreciate the extent of benefits derived by the users and the number of trains that must be provided to meet the demand. The railways' figures of journey undertaken by suburban passengers are wide of the mark, because they reckon that every season ticket holder makes only one return journey per day, and that too on working days only. Irrespective of the charge that railways may make for their season ticket, there can be no question that they ought to know how often each season ticket holder, on the average, undertakes journeys as it is only with this knowledge that an adequate service can be built up by them. The travel habits of the public change with the conveniences provided by the railways; and, the greater the conveniences, the larger the travel. Indices in this respect are unquestionably necessary for the assessment of railways' requirements of stock and track capacity. This is of special significance to Calcutta where electrification will change the speeds of travel and make repeated journeys possible for those who can at present do no more than undertake a return trip every day. Similarly, the large midday travel on the Western Railway in the heart of the city appears attributable to this leisure hour use of the season ticket without any cost to the user or return to the Railway.

806. Passenger movement data trainwise, as derived from census on trains, furnishes the railways with material to regulate their operation so as to give equitable service to the majority of their constituents. For example, if we study the figure of passengers travelling between Katwa and Howrah on the Eastern Railway, we will observe that Katwa is a station 90 miles from Howrah on the loop section, branching off from the main line at Bandel Jn. which is 25 miles away from Howrah. Trains generally take 4¼ hours on the run and there is a considerable volume of traffic moving to Howrah in the morning. Train No. S. 94 leaves Katwa at 4-39, passes Bandel at 7·51 and reaches Howrah at 8-54 and because of its long run must have lavatories and other amenities required by passengers on a 4¼ hours journey.

807. The number of passengers noticed on the random census taken on 29-12-55 at different points on its run between Bandel and Howrah are as follows:—

Leaving—		
	Bandel	669
	Chinsura	752
	Chandernagore	890
	Serampore	1014
Arriving	Howrah	1014

The carrying capacity of the train was only 653 and it had 669 passengers when leaving Bandel but, between Bandel and Howrah, it stopped at 3 stations to pick up 474 passengers and set down 129 passengers, which brought about considerable overcrowding. This could have been avoided, if the train which runs for a considerable distance was made to run non-stop between Bandel and Howrah, thus diverting the passengers that overcrowded this train to short distance Bandel locals which run before and after it. One of them leaves Bandel 13 minutes before and arrives at Howrah 9 minutes later and the other leaves Bandel 10 minutes later and reaches Howrah 36 minutes later, with passengers below their carrying capacity at the points where passengers overcrowd the train from Katwa (No. S. 94).

808. If we now look up the corresponding train leaving Howrah at 17-25 for Katwa, we find an even more pathetic picture in that against a carrying capacity of 665, the train ran with 1031 passengers, making it extremely difficult for Katwa passengers to get into the train. It stopped at Chandernagore, Mile 21, and Chinsura, Mile 23, to detrain 370 and 117 passengers respectively, which relieved its overcrowding. Had the train been run-non-stop to Bandel, this overcrowding would have been avoided and passengers for those stations would have been carried by a train leaving Howrah 5 minutes later at 17-30. On the day in question, it started from Howrah with 804 passengers and got half emptied by the time the train reached Sheoraphuli, Mile 14.

809. In making these observations, we assume that our recommendation with regard to increasing the carrying capacity of suburban trains meets with the Government's approval and for short runs seating plus standing capacity of trains on the steam sections also is increased, and suburban trains on short runs are enabled to carry about 1200 passengers.

810. For a similar example on the Madras electrified section, we would invite attention to paragraph 737 where we have referred to trains lightly loaded running non-stop through a series of stations. In this case, addition of a few stops will fill these trains to capacity and relieve overcrowding on others.

811. Numerous other examples will be found in the census charts of different areas given in the annexure and we would not burden this part of the report in order to bring home further the point we are making.

Stoppage of the Deccan Queen at Kalyan

812. On the Central Railway, the Deccan Queen runs between Bombay and Poona with first class accommodation only. It leaves Bombay at 17-10 hours arriving at Poona at 20·20 hours and leaves Poona at 7-25 hours arriving at Bombay at 10-30 hours. Although Poona can hardly be treated as a suburb of Bombay, this train forms an important link between the two stations and the train arrives and leaves Bombay during the suburban rush period. The only halts on this run are Karjat, Kirkee and Lonavala. It does not halt at Kalyan.

We made enquiries about the popularity of this train and learnt that it was well patronised during the hot weather and on race days but ran half empty during the cold weather. We made casual inspection of this train and found that it had in all about 330 seats. Enquiries indicated that, except for trains leaving Bombay on Saturday and those leaving Poona on Monday when about 250 seats are taken up on other days the number of seats taken up was about 150, of which only 10 or 12 were occupied by Season ticket holders. A check on the occupation of the Deccan Queen from Poona to Bombay made by the Railway on 2nd December, 1955, *vide* Central Railway letter No. G15/128-SOEC, dated 13-12-55, confirmed that, out of the 336 seats, 94 seats were taken by Card ticket holders, 15 seats were taken by pass holders and only 9 seats were taken by Season Ticket holders, and the rest 218 seats went unoccupied.

It appeared to us that this train could be better made use of, if a halt at Kalyan was provided. Kalyan is an important junction and, since the suburban section of the Bombay Railways are extending to Karjat and Kasara and there are colonies at Ambernath and Vithalwadi, passengers from these sections could be brought into Bombay by this fast train if this train made a halt at Kalyan.

Running of Bombay-Calcutta Mail outside Peak Hours

813. The Bombay-Calcutta Mail leaves Bombay at 18-15 hours when the evening suburban rush from the city is on and takes up line capacity which might otherwise be available for the use of suburban trains. There have been representations about putting back

this train so as to avoid the rush hours and the Central Railway have made efforts to meet the wishes but have not succeeded, as its arrival time in Calcutta precludes its being put back. An examination of the halts made by this train indicates that it has the following halts which, to us, appeared to be capable of reduction.

Kalyan	5 minutes.
Manmad	10 ,,
Bhusaval	20 ,,
Murtazapur	5 ,,
Badnera	10 ,,
Wardha	10 ,,
Nagpur	20 ,,
Gondia	12 ,,
Dongargarh	11 ,,
Raipur	11 ,,
Bilaspur	10 ,,
Raigarh	12 ,,
Jharsuguda	12 ,,
Chakradharpur	10 ,,
Khargpur	11 ,,

We suggest that this aspect should be carefully examined with a view to this train being started later from Bombay, so that the through line can be used for the outgoing suburban trains.

Hazardous entraining and Discipline

814. We noticed at Victoria Terminus, during the rush hours, a good many young and energetic men stand in between the running lines, on the off side and jump into an incoming train, before it came to a stop, in order to ensure comfortable seats for themselves. Neither the railway staff nor the police seemed to take any notice of this matter. One might think in terms of providing fencing to prevent persons running these hazards, but we feel that no number of barriers or mechanical devices would deter people from taking hazards, unless there was a sense of responsibility drilled into them and there was staff at site to ensure it.

815. Although the system of queueing up for buses is well recognised and observed in the city of Bombay, little regard to priority is given in the matter of entraining in and detraining from trains. Very often passengers, even at the terminus, try to force themselves into an incoming train, before passengers that have arrived in it are able to get out. In fact, they are prevented from getting out by the premature and sudden onrush. We consider that there is scope for both propaganda and social education which will introduce discipline and order on suburban platforms.

Ferry Service on the River Hooghly

816. The increase in the quantum of suburban traffic which has to be carried by the South Eastern Railway, is to a certain extent, attributable to the abolition of the ferry service that existed on this river for a very long time. Evidence was led before us that its abolition has caused a hardship to its users and its restoration would ease the overcrowding on the South Eastern Railway. Our enquiries from the Commissioners for the Port of Calcutta revealed that the Calcutta Steam Navigation Co. Ltd., Managing Agents, Messrs. Hoare Miller & Co. Ltd., ran a ferry service between Talkal, Ramakrishnapur, Shibpur and Chandpal Ghats and Tucktaghat, Metiabruz, Rajgunge and Rajabagan Ghats up to February, 1951, but as they found that the service was no longer profitable to them they discontinued it. In August, 1951, the Sundarban Launch Syndicate started a service in the same area but after a short time of their operation siltation in the river prevented their making use of the

Shibpur and Talkalghat ferry landing stages while the Metiabruz landing stage got damaged and they had, therefore, to discontinue this service. They are at present running their launch ferry service between Chandpal and Ramakrishnapur and between Rajgunge and Rajabagan and are understood to be eager to resume the service in the other four stations if the landing stages are put back into commission. The Commissioners for the port of Calcutta are understood to be investigating the possibility. Considering that quite a good proportion of the suburban travellers on the South Eastern Railway have to cross the Howrah bridge to reach Calcutta, it appears to us that a ferry service provides an advantageous and alternative method of travel especially to those whose place of work happens to be near the jetty served by the ferry services. We recommend that the feasibility of the restoration of the ferry service should be thoroughly investigated and early decisions taken so that the extra load thrown on the South Eastern Railway is taken off from it.

Overcrowding due to inadequacy of workmen's trains at Madras

817. Evidence was led before us that two workmen's trains were run before the war on the broad gauge section of the Southern Railway. During the war, their number was reduced to one and this has continued, despite the fact that the shops at Perambur have a larger number of workmen now and an additional shop *viz.*, the Integral Coach Factory has been started there. It was stated that, owing to the inadequacy of accommodation on the workmen's trains, workmen travelled by the local trains, thus adding to the overcrowding on them. On the matter being discussed with the General Manager and the Heads of departments of the Southern Railway, the Chief Mechanical Engineer corroborated the evidence and the General Manager agreed to restore the second train for workmen and thus remove this cause of overcrowding.

Variations in Carrying Capacities of Rakes working the same train

818. The Committee noticed that rakes with carrying capacities which vary over a very wide range are employed in rake links, particularly of steam trains, with the result that for the same quantum of traffic different degrees of overcrowding may result on different occasions. This is largely attributable to the lack of attention paid in forming rakes for suburban services. This, in so far as uneven distribution is concerned, is easy to rectify but there is an underlying tradition of using on the suburban section any old coach that is not fit for main line service. The Committee realise that Railways are endeavouring to make the most of the stock they have on hand and it is no wonder that what is not good enough for use on main line is relegated to suburban service. In the context, however, of the growing demand for electrification of suburban services all over, the Committee desire to draw attention to the fact that considerable improvement in travel conditions can be effected at much less expense if sufficient attention is bestowed on the provision of stock suitable for the purpose. Apart from the economics of the two modes of traction, electric and steam, and their justification based on the intensity of service required, it must be realized that the difference in initial costs of stock for the two types is considerable.

A rake of 9 coaches of EMU stock ordered for Calcutta railways costs about Rs. 36 lacs while a rake of 9 coaches on a steam train of the standard HAL design costs 11½ lacs exclusive of a locomotive which even if it costs 6½ lacs would still make the cost of an engine hauled train 18 lacs, equal to half the cost of an EMU train. It would therefore, pay to provide suitable steam stock for suburban service if the agitation for electrification is to be pacified, in cases where the same is beyond our resources and economically unjustified.

Detentions to Suburban trains to give precedence to Faster Trains

819. Evidence was led before us that mails and expresses are scheduled to overtake peak hour suburban trains every day causing a hold up of the suburban trains for 15 minutes or so. The following instances were brought to our notice:—

Southern Railway.

1. No. 417 at Avadi—14 mts. for precedence of No. 561.
2. No. E33 at Avadi—13 mts. for precedence of No. 513.

South Eastern Railway.

1. S/25 Up Howarh-Panchkura Local at Andul for 14 mts. to give precedence to 43 Up Howrah-Madras Mail.
2. No. S/27A Up Howrah-Panchkura Local (Saturdays only) at Bagnan for 17 mts. for precedence to No. 43 Up Howrah-Madras Mail.
3. No. S/27 Up Howrah-Panchkura Local at Bauria for 14 mts. to give precedence to 42 Up Howrah-Bombay Mail.
4. No. S/7 Up Howrah-Machada Local at Bagnan for 16 mts. to give precedence to 42 Up Howrah-Bombay Mail.
5. No. S/5 Up Howrah-Panchkura Local at Machada for 19 mts. to give precedence to 42 Up Howrah-Bombay Mail.

The problem, as stated above, hardly comes within the terms of our reference as it is not an instance of overcrowding but of the inconvenience suffered by a suburban traveller during the course of his daily journeys. We have chosen, however, to refer to this aspect, chiefly because one of the measures for reducing overcrowding is the provision of standing accommodation and this can only be tolerated if the duration of suburban travel is kept down to the minimum and it is only from this point of view that we focus attention on the lack of facilities and the time-tabling as in force with a view to redress of this grievance in a suitable manner. It would not appear necessary for us to dwell at length on the irritation and delay caused to suburban passengers held up by fast trains overtaking suburban trains, during the rush hours, nor to draw pointed attention to the lack of overtaking facilities which makes these halts longer than they need be. We are mentioning the case of the South Eastern Railway, only to illustrate the conditions obtaining on that railway where 12 out of the 22 suburban stations have no overtaking facilities and, in two instances, two such stations Kulgachia-Birshibpur and Fuleswar-Chengail are contiguous with the result that if a fast train which may or may not be running to time has to overtake, the suburban train is sometimes held up two stations in advance to provide a clear path. We draw attention to this aspect for local examination and provision of such facilities and regulations as will minimize the detentions in these and other similar instances.

CHAPTER IX

CONCLUSION

901. We should like to conclude this report with a brief reiteration of the more important of our recommendations, railway by railway. But before we do so, we would refer to the old adage, "knowledge is power", as apt here as elsewhere. Diagnosis precedes remedies, but a knowledge of the facts of the situation must go before either, which, in the present instance, can best be acquired by setting up an organisation to collect data of the travel needs of the suburban resident; the extent, the range and the time of the day of his journeys. From these details the nature of the train service and its timings follow easily. Hence our emphasis on the census of passengers, train by train, station by station, and space-time-speed studies as the only reliable basis for the fairest distribution of the available resources and their optimum deployment.

902. One lesson that has to be learnt is that when large passenger concentrations take place, the number travelling from any point is great, and if a fast service from the different points can be run by turns, it saves time for the traveller and ensures the maximum utilization of the stock. To deal with the surges of traffic, therefore, fast trains with limited number of stops is the ideal solution and there is abundant evidence of it in the data we have collected. People by the hundreds collect at each halt to catch the fast train even when it is overfull and this, in our opinion, gives the key to the solution of the problem. The provision of really fast trains from different points in the morning and to the different points in the evening is the need which requires to be satisfied.

903. In the case of Bombay, the Western Railway could do a lot more, in this direction, by replacing stopping trains by fast ones, thereby putting in many more. They could serve their outer suburbs by stock other than EMU, and, if during the rush hours, they concentrated their EMU stock on stations short of Borivli, there would be a far larger number of trains and a vastly improved service. This does not mean that the Railway does not require extra stock but since EMU stock is neither standardized by Indian Railways nor manufactured in India, the best course is to take early steps in this direction and phase their supply on a regular programme to enable the manufacturing industry to be assured of orders for a term of years. In the meanwhile, fast long distance trains should be run with stock indigenously manufactured but adopted for suburban travel and hauled by locomotives, be they electric, diesel or steam as can be made available. This is not only more economical but just as fast and efficient for the special purpose of clearing large numbers of passengers, during the rush hours for distant destinations. Terminals will require to be equipped to deal with engine hauled trains and the reversal of engines, but there are no insurmountable difficulties in that direction. Even Churchgate could deal with such trains when the proposed yard extensions are completed, but, if this system is adopted extensively, a few more stabling lines would need to be added to that yard.

904. The problems on the Central Railway are not very different from the above, and it is gratifying to note that this Railway does run a larger number of fast trains, but their operation is severely hit by the endeavour to provide direct train services to each destination, without requiring the passengers to change trains. These direct services to Thana, Bandra and Andheri *via* the Harbour Branch involve criss-cross movements, reduce the speed of travel and make operation unnecessarily complicated. In doing so, they upset punctuality, regularity and flexibility not only of their own trains but also those of the Western Railway, on which they run between Mahim and Andheri. If suitable transfer facilities are developed at stations of interchange, the railways' resources can be conserved by terminating the services from Victoria Terminus at Mahim and cutting out trains from Victoria Terminus to Thana *via* the Harbour Branch. Harbour Branch trains may run from Vadala Road to Chembur or Mankhurd but not to Thana. Straight services running forwards and backwards are calculated to simplify operation, and divert passengers to the faster runs.

905. The Central Railway possesses the advantage of having main and suburban lines running right through its suburban section, and is in a better position to run engine hauled fast trains to clear the rush period traffic and to save on EMU stock, which is particularly useful for short runs.

906. Both the Railways could, with advantage, run their new rakes at greater speeds and fully utilize the large power units installed in them by working them on separate links providing more intensive and faster services. The slow runs, not popular during periods of rush, could be made with single units, thereby releasing more stock for fast trains.

907. On the electrified section of the Southern Railway, too, the problem is much the same,—paucity of stock, and its uneven distribution has led to excessive overcrowding. For lack of terminal facilities, full use during the rush hours is not made of electric engine hauled trains. Space is available for the development of facilities at the terminus to reverse engines from one end of the train to the other without much expense or trouble. If, during the rush hours, all trains on the Guindy-Beach section are run with double units, reinforced with a third class coach in between, and single units are employed on the Guindy-Tambaram section, the utilization of stock will fit in with the demands of traffic, overcrowding will diminish, and passengers will be more evenly distributed. If, in addition, each of the three electric locomotives that they have, run out one train each during the period of rush, the service will be adequate to the needs of the present traffic.

The EMU stock has very little standing accommodation and is literally filled with seats; some of which can, with advantage, be removed to create standing accommodation for short distance passengers. This aspect can be exploited to a still greater extent on the third class coaches that augment the loads of these EMU rakes by providing only standing accommodation on them.

908. On the broad gauge section of the Southern Railway, there is very little overcrowding, and such that there is, can be easily eliminated by the provision of standing room inside the coach, and by running trains with the full number of carriages. The latter step will need the shifting of the motor loading work from the Central station to other stations in Madras, which move is effected easily.

909. The problem on the Calcutta Railways, where steam traction is being replaced by electric traction, is of an entirely different nature, as the vast possibilities of improved service with steam traction have been eclipsed by the general belief that nothing short of electrification will solve the problem of overcrowding. It is true that electric traction means improved speeds and this means enlargement of the area of the suburbs, but where overcrowding is concerned, it is more a matter of the type of the coach and accommodation in it than the mode of traction. Most stock on steam trains in Calcutta and elsewhere is of the obsolete pattern, very often unfit for main line use, with seating arrangement unsuited to the requirements of suburban service. Large crowds literally invade trains as they approach the city terminus. Whereas this area is wide in the case of electrified traction with fast speeds, it is none the less there in the case of steam trains, even though it is limited to 10 or 12 miles. It is, therefore, incumbent on the railways to so alter the seating arrangement that these invading crowds get standing room and take shelter on the train instead of travelling on the footboards. The Railways' programme to spend crores on electrification offers a strange contrast to their parsimony in grudging an expenditure of even a few lacs to build suburban coaching stock of adequate width and capacity. This position has perhaps arisen less out of a disregard for the comforts of passengers than out of imbalance in planning. Passengers in their eagerness, however, make the best of the cheap travel facilities offered on a season ticket, brave discomfort, and cram the trains that somehow will take them to work and back at the time that is most convenient to them.

910. We are firmly of the opinion that much needed relief to passengers can be given by re-arranging the seats, by providing standing room on the existing stock, by the use of wider and more suitable stock, and by arranging to have those trains, which do not return immediately, hauled by tender engines of greater capacity, which in turn will allow of the addition of more coaches. For sections on which the capacity of terminal yards for the reception of trains, and the facilities for the disposal of engines and rakes have reached the limit, we suggest trials with engines at both ends, so that the trains can be worked backwards and forwards in much the same way as EMU rakes do.

911. For these observations we should not be regarded as having failed to appreciate the magnificent performance of the railways in the handling of large volumes of traffic with the very meagre equipment at their disposal. They are going all out and keeping the entire suburban stock in service, with the unavoidable consequence that there is no reserve left for emergencies. No wonder that in consequence proper standards of punctuality and regularity are not being maintained. We feel that the standards at present are below the levels, which the railways desire to set before themselves, or which the public expect of a nationalized undertaking.

Acknowledgment

912. The Committee takes this opportunity of thanking the various Passenger Associations, Chambers of Commerce, other public bodies and individuals who, at considerable inconvenience to themselves, have replied to our questionnaire and helped us in our enquiry

with written and oral evidence. Most or our work has lain on railway premises and with Railwaymen, who bore patiently the burden of collecting data for our benefit and to answer all kinds of enquiries made by us. We are grateful to the General Managers of the five railways concerned, their Heads of Departments, Officers and subordinate officials for all they did to furnish the data we asked for and for explaining details to us. But for their co-operation and the diligence of the Liaison officers, appointed by the General Managers to accelerate the replies to our queries, the work of our Committee would have been much delayed.

It would be invidious to mention some names and not the others, but we cannot help recording the gratitude we owe to Sarva Shri R. M. Sinha, Adviser Signalling and L. A. Natesan, Economic Adviser, Railway Board for giving us valuable information about railways in foreign countries which we could not otherwise obtain in the short time at our disposal.

Finally we record our thanks to our Secretary and his staff who have put in very long hours most ungrudgingly and with the greatest enthusiasm and richly deserve our gratitude and appreciation.

BRIJ BIHARI VARMA, *Chairman.*

AKHIL CHANDRA CHATTERJEE, *Member.*

KARKUL MADHAVA RAU, *Member.*

K. SAMBAMURTI, *Secretary.*

NEW DELHI;
The 9*th April* 1956.

APPENDIX I

COPY OF RAILWAY BOARD'S LETTER No. 82—TG/55/4, DATED THE 27TH JANUARY, 1956.

MINISTRY OF RAILWAYS

(RAILWAY BOARD)

No. 82-TG/55/4

New Delhi, the 27th January, 1956.

To

The Secretary,
Suburban Overcrowding Enquiry Committee,
Beach Railway Station,
Madras.

Points for Consideration by the Committee.

The following extracts from the Seventeenth Report of the Estimates Committee of Parliament is reproduced below for consideration :—

> "The Committee recommend that the following points should also be examined in connection with the overcrowding in suburban trains:—
>
> (i) Provision of standing accommodation only in some compartments of suburban trains by removing the benches.
>
> (ii) Reducing the minimum headway between trains to about 3 minutes against 4 minutes at Churchgate and 5 minutes at Victoria Terminus, by improved signalling arrangements as suggested by the Indian Railway Delegation to the Soviet Railways and other European Railways ; and
>
> (iii) Staggering the office hours at Calcutta, Bombay and Madras, in consultation with the State Governments and the local business offices, so that the peak period can be spread out."

(Sd.) M. V. BHAVNANI,
Deputy Director, Traffic (General)
Railway Board.

COPY OF LETTER No. SOC/SUGGESTIONS/6, DATED THE 8TH FEBRUARY, 1956, FROM THE SUBURBAN TRAIN OVERCROWDING ENQUIRY COMMITTEE.

Office of the Suburban Train Overcrowding Enquiry Committee,
Madras Beach Railway Station Building,
Madras, 1. Camp : "N" Block, New Delhi.

No. SOC/Suggestions/6

New Delhi, the 8th February, 1956.

The Deputy Director, Traffic (General),
Railway Board, New Delhi.

SUBJECT :—*Points for consideration by the Committee.*

I am to acknowledge receipt of your letter No. 82-TG/55/4, dated 27th January 1956 and to communicate that the same was placed before the Committee at its meeting on the 7th February, 1956.

I have been directed to advise that items (i) and (iii) have received full consideration of the Committee and in fact are covered by items 3(*b*) and 8 of their Questionnaire to the Public issued early in November, 1955. With regard to item (ii), the Committee learnt during its proceedings at Bombay that Railway administrations were in communication with the Railway Board on this aspect and had put forward their proposals in this respect. If the Government desire this Committee to deal with this question, they will require to have in their possession the correspondence that has passed between the Railway Board and the Railway administrations and would also like to know the names of Railway Board's representatives who have gone into this question and are qualified to tender evidence before this Committee.

(Sd.) K. SAMBAMURTI
Secretary.

APPENDIX II

QUESTIONNAIRE

CONSTITUTION OF THE COMMITTEE

Shri B. B. Varma	*Chairman*
Shri A. C. Chatterjee	*Members*
Shri K. M. Rau	
Shri K. Sambamurti	*Secretary.*

GOVERNMENT OF INDIA

MINISTRY OF RAILWAYS

(RAILWAY BOARD)

NEW DELHI;
10*th* *November*, 1955.

RESOLUTION

No. E55C01/73/3. While introducing the Railway budget for 1955-56, the Minister for Railways indicated that he had decided to set up a small Committee to investigate and suggest remedial measures in respect of the problem of excessive overcrowding during peak hours in suburban train services at Bombay, Calcutta and Madras. Accordingly the Government of India have appointed a Committee which consists of—

(1) Shri B. B. Varma, retired General Manager of Indian Railways	*Chairman*
(2) Shri A. C. Chatterjee, retired General Manager of Indian Railways	*Members*
(3) Shri K. M. Rau, retired Controller of Stores of Indian Railways	

The terms of reference of the Committee are—

(i) to investigate into the problem of excessive overcrowding during peak hours in the suburban services at Bombay, Calcutta and Madras ; and

(ii) to suggest remedial measures.

The Headquarters of the Committee will be Madras.

MADRAS BEACH,
16*th* *November*, 1955.

DEAR SIR(s),

It is requested that you will kindly assist the Committee by replying this Questionnaire at your earliest convenience. It will be greatly appreciated if the reply is sent not later than the 15th December, 1955.

The reply to each question may kindly be given on a separate page or pages. Also, five copies of the replies may kindly be furnished, to facilitate consideration by the Committee.

Yours faithfully,

Suburban Train Overcrowding Enquiry Committee.

QUESTIONNAIRE

1. Which, in your experience, are the most overcrowded sections of the suburban railway services in Bombay, Calcutta and Madras and during what periods is the overcrowding excessive and between what stations ?

2. To what extent should the number of suburban trains be increased, during the peak periods, on the different sections ?

3. (*a*) What are the opening and closing hours of the industrial concerns and offices which the bulk of the peak hour travellers attend ? Please give the names of industrial concerns and offices, their opening and closing hours and the approximate strength of staff in each, as far as known to you.

(*b*) Will the staggering of the opening and closing times of offices and industrial concerns help to spread the rush of passengers over a longer period and thus effect relief ? If so, to what extent can this staggering be effected ?

4. Do you consider that this spreading of rush hours over a longer period can be assisted by the introduction of different fares for the peak and non-peak periods, thus providing an incentive for people to avoid the peak periods ? If so, what difference in fares do you consider would act as a suitable incentive ?

5. Does the present state of overcrowding lead to passengers with lower class tickets travelling in higher classes ?

6. If, during peak periods, more trains can be run by making some trains skip certain stations, do you see any objection to this being done ?

7. Is the duration of halts of suburban trains, during peak periods, unduly long at any station and can it be reduced ? If so, please give examples.

8. Have you any suggestions for increasing the carrying capacity of suburban trains ?

9. Do you know of any delays, restrictions or avoidable stops that could be eliminated, with a view to speeding up transport ?

10. Have you any suggestions for co-ordinating the Road and Rail transport within suburban areas, with a view to decreasing overcrowding on Railway Suburban Service ?

11. *(a)* Please state if, in your view, the suburban traffic will increase or decrease or continue at the present level, during the next few years. Please also furnish, in detail, the reasons for your view.

(b) If you are of the view that there will be an increase or decrease, please indicate the sections and the approximate percentage of increase or decrease.

12. Apart from your answers to the above questions, have you any suggestions to make about reducing the overcrowding in suburban trains in any of the three regions—Bombay, Calcutta and Madras ? If so, please give them in the fullest detail.

सत्यमेव जयते

APPENDIX III

Copy of the Press Notification issued by the Suburban Train Overcrowding Enquiry Committee, in continuation of the Questionnaire

QUESTIONNAIRE ON SUBURBAN TRAIN OVERCROWDING IN BOMBAY, CALCUTTA AND MADRAS.

The Suburban Train Overcrowding Enquiry Committee have issued a Questionnaire, on its terms of reference. The Questionnaire has been circulated to the Passenger Associations, Trade and Industry, Chambers of Commerce, Educational Institutions•State Governments, etc.

The Committee will be glad to supply copies of the Questionnaire to any person or public body interested in matters pertaining to overcrowding in the suburban trains in Bombay, Calcutta and Madras and who might not have received a copy.

The Questionnaire may be had, on application, from the Secretary, Suburban Train Overcrowding Enquiry Committee, Madras Beach Railway Station Building, Madras-1.

Suburban Train Overcrowding
Enquiry Committee

APPENDIX VIII

COPY OF DEMI-OFFICIAL LETTER, DATED 7-11-1955, ADDRESSED TO THE GENERAL MANAGERS OF THE CENTRAL AND WESTERN RAILWAYS, BOMBAY, SOUTHERN RAILWAY, MADRAS AND EASTERN AND SOUTH EASTERN RAILWAYS, CALCUTTA.

Office of the Suburban Overcrowding Committee, Madras Beach.

B. B. VARMA *Chairman*

Camp: Delhi, the 7th November, 1955

D.O.No. SOC/D/35.

MY DEAR *

SUBJECT :—*Railway Suburban Overcrowding Committee.*

I am writing this to give you advance information of our plan of visits to Bombay, Calcutta and Madras. As far as we are able to see at the present moment, we intend to be in Bombay from 21st to 30th November, in Calcutta from 5th to 10th December, 1955 and in Madras from the 19th to 31st December, 1955. While at each place it is the Committee's intention to go over the entire suburban area and get first hand knowledge of the conditions there. It would greatly facilitate the work of the Committee if you would be good enough to let us have a topographical plan showing the suburban sections and a brief memorandum giving the salient points about the services and the difficulties that are at present encountered in coping with the traffic that is offering.

2. As the terms of reference of the Committee relate to the excessive overcrowding during peak periods, their first business will be to determine what these periods are and what is the extent of the overcrowding. We feel it would be neccessary to determine the number of passengers travelling on each of the trains, right along its course. We do not know what statistics with regard to the number of passengers travelling on each train are already in your possession or what method will be most suitable for obtaining them, but if it is possible to cordon off each train at each station either by means of manipulating gates or by providing temporary rope cordons, it may be possible to count the number of heads getting in or out of the train at each station, irrespective of the class of travel or the type of ticket or pass held. A chart of the number of passengers on each train from its starting point and when leaving each subsequent stop may then be plotted. Perhaps, such a census will have to be kept taken for a whole normal week, as that will give 5 days of week day traffic and 2 days of the week-end. We visualise that these charts will enable us to gauge both the peak hours and the extent of overcrowding. We realise that it will involve considerable work for the Railways to conduct this census but it is unavoidable if we are to be sure of our grounds.

3. Along with the above information, if we could also have brief notes of the difficulties encountered by the various departments of the Railway in running more trains, augmenting the load of existing trains or accelerating them, we would get a fair idea of the situation and it will greatly facilitate our work. We realise that we are rushing you with a lot of information, but trust you would not mind it; and, if this information can be with us a few days before we reach your station, we could study it in advance of our going round.

Looking forward to the pleasure of meeting you in the near future.

Yours sincerely,

(Sd.)

* Shri M. N. Chakravarti, General Manager, Central Railway.

Shri S. Sarangapany, General Manager, Eastern Railway.

Shri T. A. Joseph, General Manager, Southern Railway.

Shri N. C. Kapoor, General Manager, South Eastern Railway.

Shri M. Ganapati, General Manager, Western Railway.

APPENDIX IX

Extract from Chapter 14 (yard and terminals) of American Railroad Engineers' Association Proceedings, Volume II

17. *Time-Space-Speed Studies.*—

(*a*) Under normal conditions passengers discharge from trains to station platforms at approximately the following rates per single car exit.

1. On the low platforms:—
   - (*a*) From sleeping cars (after hand baggage has been unloaded)—1 passenger every 2.6 sec.
   - (*b*) From day coaches—1 passenger every 3-0 sec.
   - (*c*) From suburban coaches with exit doors 2.4 ft. wide—1 passenger every 1-8 sec.
   - (*d*) From suburban coaches with exit doors 3·4 ft. wide—1 passenger every 1-4 sec.
2. On to platforms at car floor levels :—
   - (*a*) From suburban coaches with exit doors 2·4 ft. wide—1 Passenger every 1-1 sec.
   - (*b*) From suburban coaches with exit doors 4·0 ft. wide—1 Passenger every 0-8 sec.

(*b*) Speeds of passengers on station platforms under normal conditions are approximately as follows :—

1. When moving unrestricted as individuals :—
   - (*a*) Through passengers—4·2 ft. per sec. (2·9 mph.)
   - (*b*) Suburban passengers—5·5 ft. per sec. (3·7 mph.)
2. When moving *en masse* :—
   - (*a*) Through passengers—3·7 ft. per sec. (2·5 mph.)
   - (*b*) Suburban passengers—5·1 ft. per sec. (3·5 mph.)

(*c*) The platform space utilized by passengers when moving in compact mass, but without objectionable congestion, is approximately as follows :—

1. Through passengers—15 sq. ft. per passenger moving 220 ft. per minute.
2. Suburban passengers—10 sq. ft. per passenger moving 300 ft. per minute.

(*d*) Capacities of station platforms in discharging passengers are approximately as follows :—

1. Through passengers—15 per foot of width per minute.
2. Suburban passengers—30 per foot of width per minute.

(*e*) The carrying capacities of stairs decrease with increase in height. For a height of 20 ft. the carrying capacities with traffic in one direction are approximately as follows :—

1. Through passenger—10 per foot of width per minute.
2. Suburban passengers—18 per foot of width per minute.

(*f*) Passenger ramps of 10 per cent gradient have a carrying capacity approximately as follows:—

1. Through passengers—15 per foot of width per minute.
2. Suburban passengers—30 per foot of width per minute.

(*g*) The rates of movement of suburban passengers which may be expected are approximately as follows :—

1. Through turnstiles (5·3 ft. in diameter)—50 passengers per minute.
2. Through single swinging doors (3·0 ft. wide)—77 passengers per minute.
3. Through double swinging doors (each 3·0 ft. wide)—117 passenger per minute.
4. Through ticketgates (each ticket punched)—46 passengers per minute.

APPENDIX X

LEVEL CROSSINGS

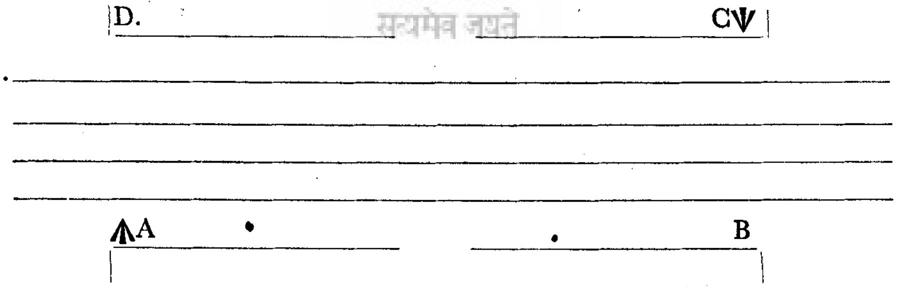
1. There are many busy level crossings on the electrified section of the metre gauge between Beach and Tambaram stations, the more important ones being in the Madras City area. The railway line is double with the trains running at intervals of six minutes during the peak period. The time intervals between trains which run in opposite directions on the two lines is hardly enough during peak hours to admit of gates being opened to pass the road traffic that offers at these level crossings and this gets worse when due to any difficulties trains are not able to run to their scheduled paths and bunch together. When once the level crossing is opened for road traffic, it cannot be closed till the accumulated slow cart traffic clears the crossing, resulting in detention to rail traffic and its overcrowding.

2. The road traffic consists of pedestrains, cycles, rickshaws, hand-cart traffic, usually very heavily loaded from and to the Madras Beach goods shed and the Springhaven Road godowns—animal drawn carts, trucks, passenger buses and motor-cars. The width of the busy crossings is as much as 52 ft. controlled by gates which are swung across the railway line or the road. These gates, in some instances, are worked by electric motors which are operated, on receipt of warning of approaching trains by bells ringing, gate-keepers with red flags, two on duty at any one time, showing red flags or signals to the road traffic.

3. Despite this elaborate arrangement, conditions at the level crossings are not favourable for quick crossing across railway lines as (1) traffic lanes are not marked (2) waiting traffic clusters nearest the gate in no marshalling order, the pedestrains, the cyclists and the slow moving carts endeavouring to get nearest to the gate, blocking the fast traffic and (3) all traffic endeavour to block the entire width of the road, with the result that when the gates are opened, traffic from opposite direction blocks each other's passage and a real pandemonium prevails till the slow moving traffic has crossed and got out of the way. This state of affairs is accentuated by the proximity of the road running parallel to the railway line which leaves little room for parking of road vehicles waiting to cross the level crossing. The impressions given above typically represent the conditions seen by the Committee at the 50 ft. wide level crossing at mile 0/5-6 on the Light House Road connecting the Marina with Parry's Corner.

4. The natural solution to a problem of this description with the traffic of the magnitude that exists at this and similar level crossings is that the railway and the road should cross at different levels : either an overbridge or subway. These suggestions, however, have their limitations and involve a lot of capital expenditure which the authorities may not be in a position to command. It is, however, felt that a lot of minor improvements can be effected at this and other level crossings if a body of expert representatives of the Railway, the Highway, and the Traffic Control Police Organization study the problems at each level crossing and execute schemes which might effect improvements. For instance, referring to the example we have chosen, it appeared to the Committee that considerable improvement can be effected if some of the measures noted below are considered and applied in the light of experience gained. The traffic moving in opposite directions on the road should have separate gate leaves or barriers for controlling them across the railway line and these gates should be so controlled that those having access to the level crossing are closed in the first instance and those on the side away from the level crossing are closed only after a reasonable interval that is required for clearing the type of traffic for which the gateway is provided. The above is best illustrated by the sketch below where gates or barriers A & C work simultaneously blocking entry to the level crossing while B & D close a little later after the traffic between the gates A & D and C & B have had their time to cross the railway lines.

(Sketch).



5. The level crossings should have separate traffic lanes marked either by lines or other devices to separate one from the other no overtaking being permissible from one lane to the other. Thus, for a busy level crossing like the one in question, it would appear advisable to provide lanes for (1) Pedestrains, (2) Cyclists and Cycle-rikshaws, (3) two or three lanes for man-propelled carts and bullock carts, and (4) buses and motor cars. We realize that this will mean constructing very wide level crossings but we are unable to visualize any reasons against such wide level crossings being provided.

6. If the sorting of traffic waiting to cross the level crossing is made as above, it follows that there should be adequate space in which these vehicles can wait when the level crossing gates are closed. This involves the shifting of the road running parallel to the railway line by a distance adequate to give space for the number of carts or buses normally likely to wait while railway trains are using the level crossing. It may be six or even 8 deep. The normal road space meant for traffic which is not using the level crossing but plies on the road without crossing the rails should lie beyond this parking area so that this does not suffer detention along with the traffic which is waiting to cross the railway line. In the case of the particular level crossing we have taken for our example, it seems to us that there is adequate vacant land still not built upon adjoining it to provide for all this.

7. Traffic Control Lights which should definitely have three aspects, green, yellow and red, should be installed on suitable posts to warn these lanes of traffic about the prospects of their being able to cross. These signal indications should be positive, the enforcing of which should be the responsibility of the traffic regulating police who should deal with violations very much in the same manner as they do at other junctions and spots where they control traffic.

8. In the particular case of the level crossing we have chosen, to illustrate our recommendations, the Committee feel that a lot of fast traffic from the Marina could be transferred across the railway line by the overbridge situated 1100 yards away from this this level crossing, but this overbridge is less attractive at the present moment because there are a number of obstructions on that road which are capable of improvement if a Committee as indicated above went into the question and executed proposals which they considered necessary. The main obstructions to fast traffic using this overbridge are :—

(i) The junction of the Mount Road where a little diversion of the road and provision of a round-about might facilitate quick negotiation by traffic coming from both directions. Space is available in the Fort St. George area to admit of this being done.

(ii) The junction of the General Hospital Road where the Junction is capable of improvement for quick movement of traffic by the provision of round-about.

(iii) A considerable crowd of pedestrain users of the Fort Railway Station virtually blocking the roadway when the train discharges its passengers. A pedestrain sub-way across the road may ensure safety to passengers as also avoid road block.

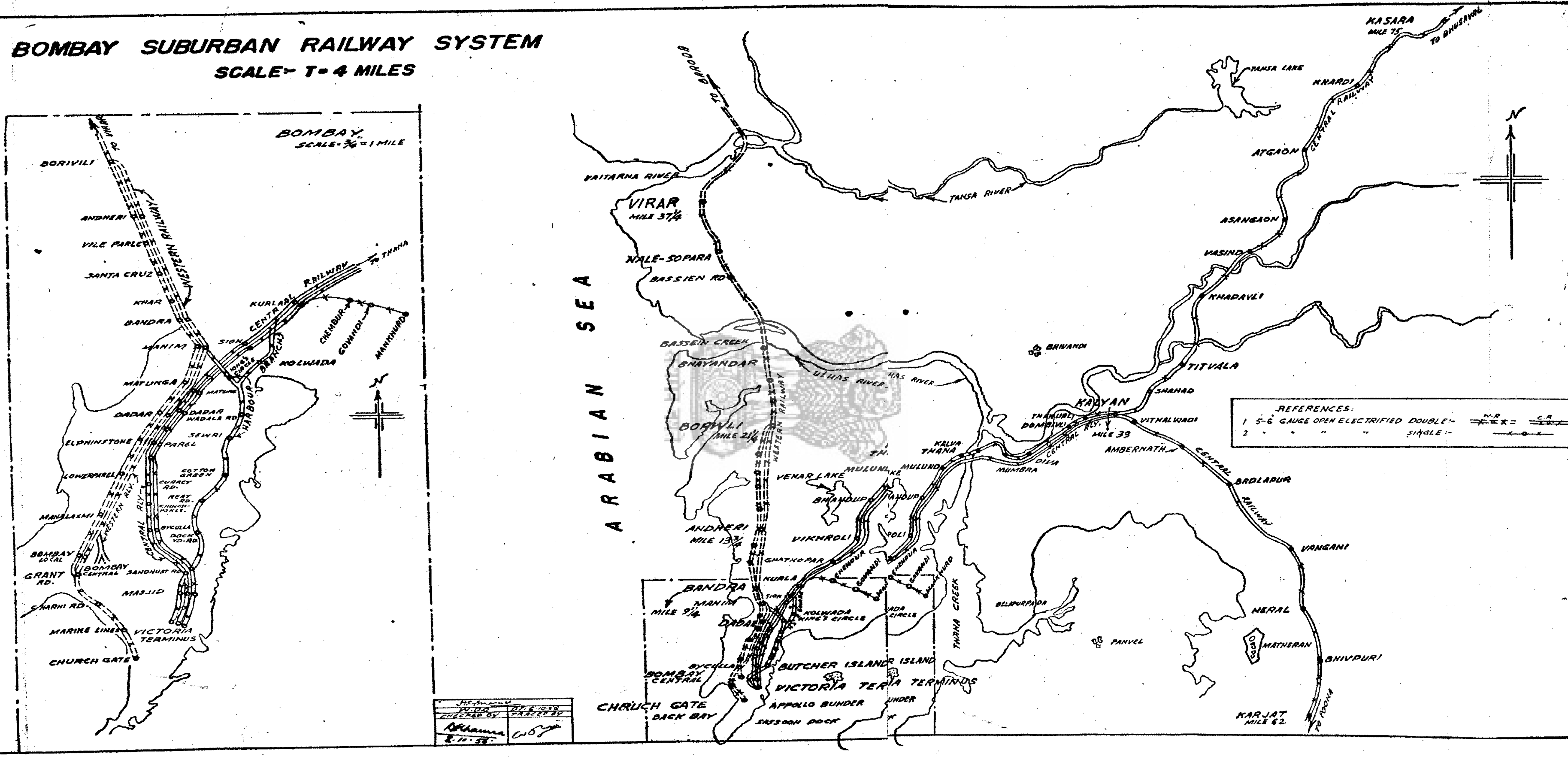
(iv) The section of the road running parallel to the Railway line from Parry's Corner to Fort station has at its centre trees grown for shade. The present road on either side allows of only two lanes of traffic each way which makes it difficult for the fast traffic to move especially as slow traffic does not keep to its lane but encroaches on the fast one. Better regulation and provision of three lanes for the fast, semi-fast, and slow traffic would go a long way to divert at least the peak hour traffic when the level crossing cannot be opened for passing road traffic.

9. We also feel that since level crossings restrict the flow of peak traffic on the railway lines resulting in overcrowding, it is necessary that steps should gradually be taken for their replacement by overbridges when funds become available but, in any case, sufficient land should be acquired by the road and rail authorities in good time before construction in the adjoining territory advances to an extent which might make the provision of overbridges difficult at a later stage. In the particular case, we have taken as our example, foundations for housing the Reserve Bank are in progress and the offices of the Port Trust are likely to be put up in the very near future.

10. A difficulty experienced in negotiating road over-bridges by the traffic that is preponderant in the harbour area is that hand-carts and bullock carts are heavily loaded and find it extremely difficult to go up the grades. Prescription of reasonable loads that can be taken by hand-carts and the adequacy of numbers of men pushing these carts may add to their manoeuverability and speed. The road authorities may consider the advisability of prescribing reasonable conditions of load and man-power to negotiate the road grades and speeds at which they are expected to travel.

GIPN—S1—1 D. T. Rly. dB.—26-11-56—400

Map of Bombay Railway Suburban Suburban Systems

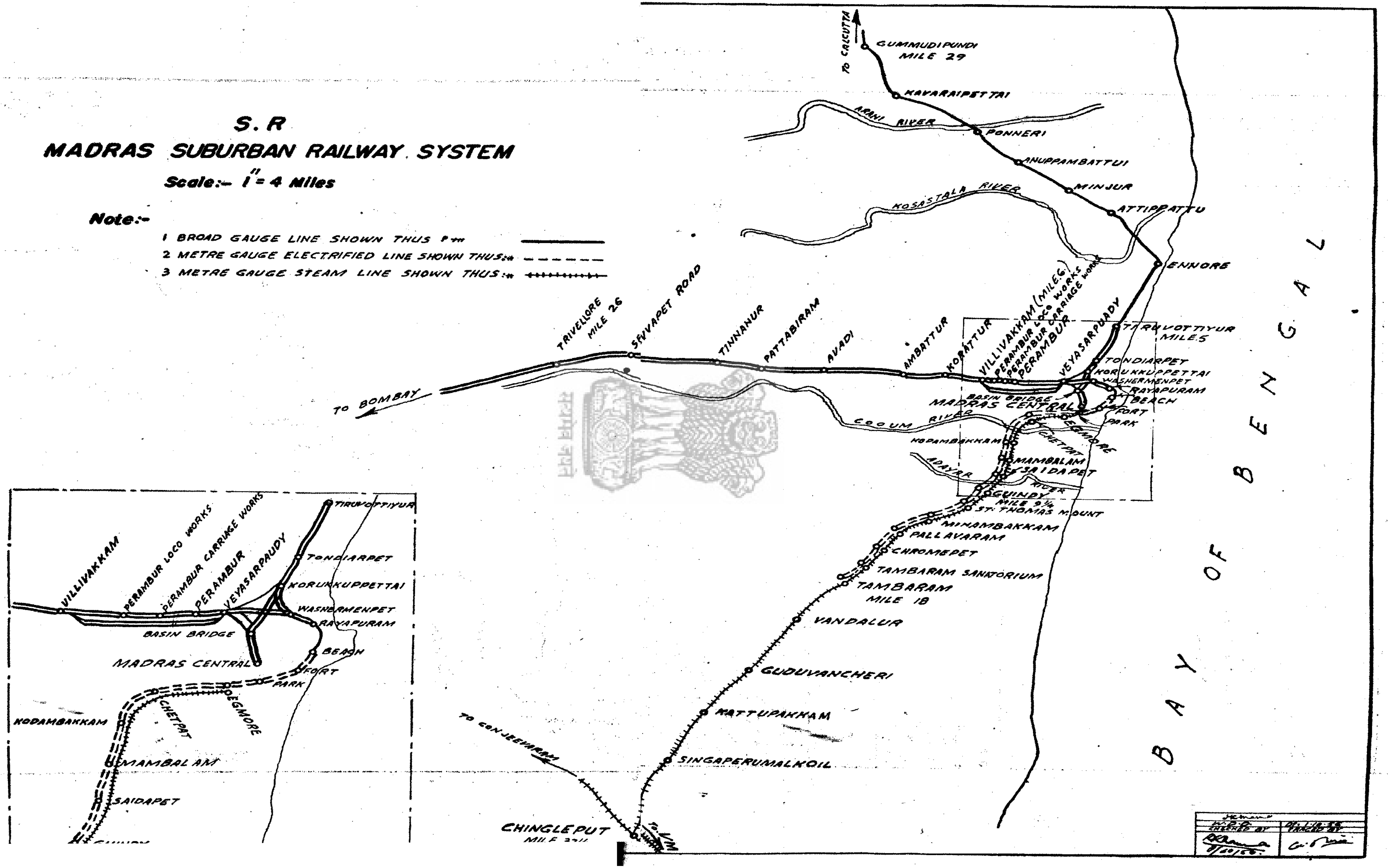


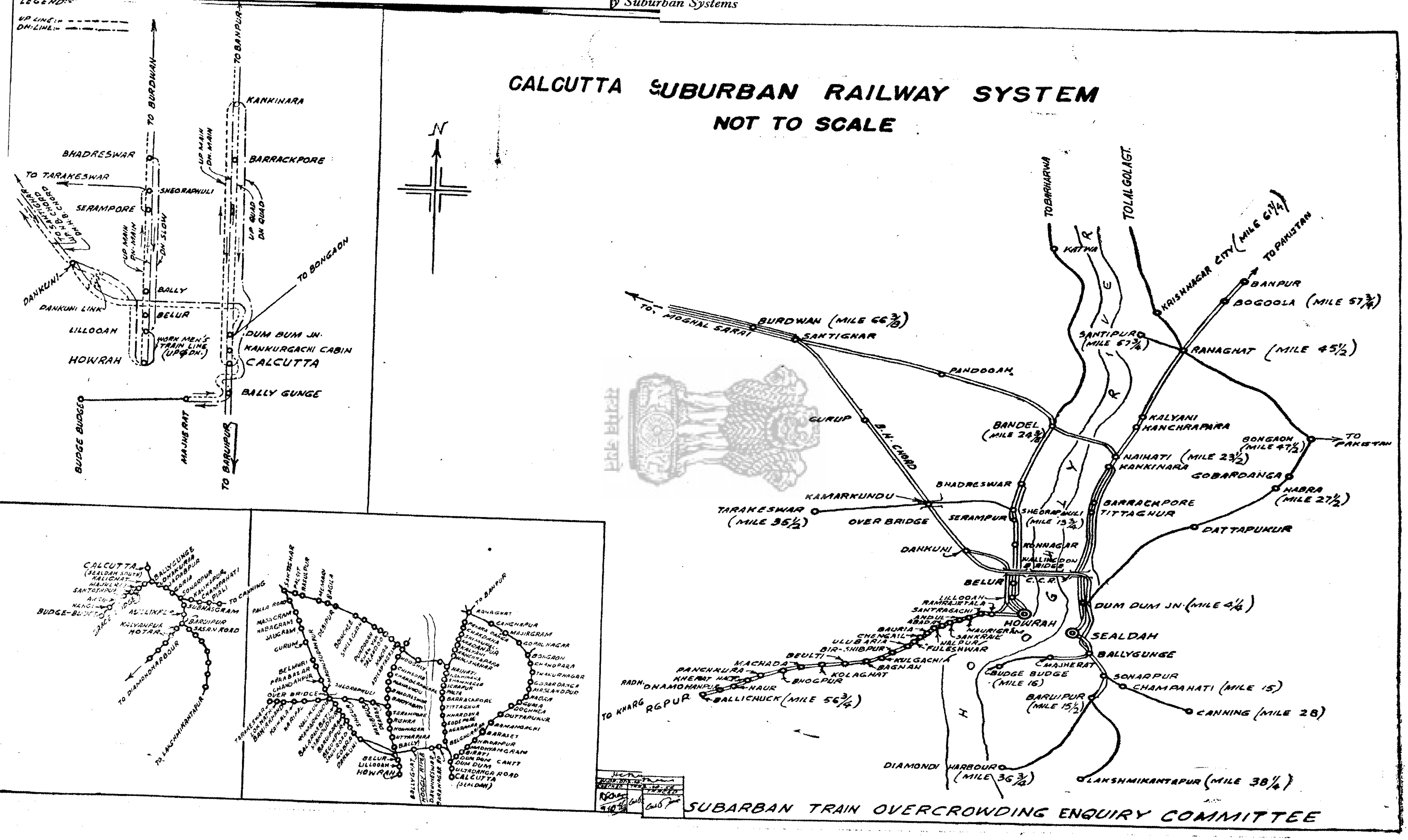
S. R
MADRAS SUBURBAN RAILWAY SYSTEM

Scale:- 1" = 4 Miles

Note:-

1 BROAD GAUGE LINE SHOWN THUS :- ▬▬▬
2 METRE GAUGE ELECTRIFIED LINE SHOWN THUS :- - - - - -
3 METRE GAUGE STEAM LINE SHOWN THUS :- ┼┼┼┼┼┼





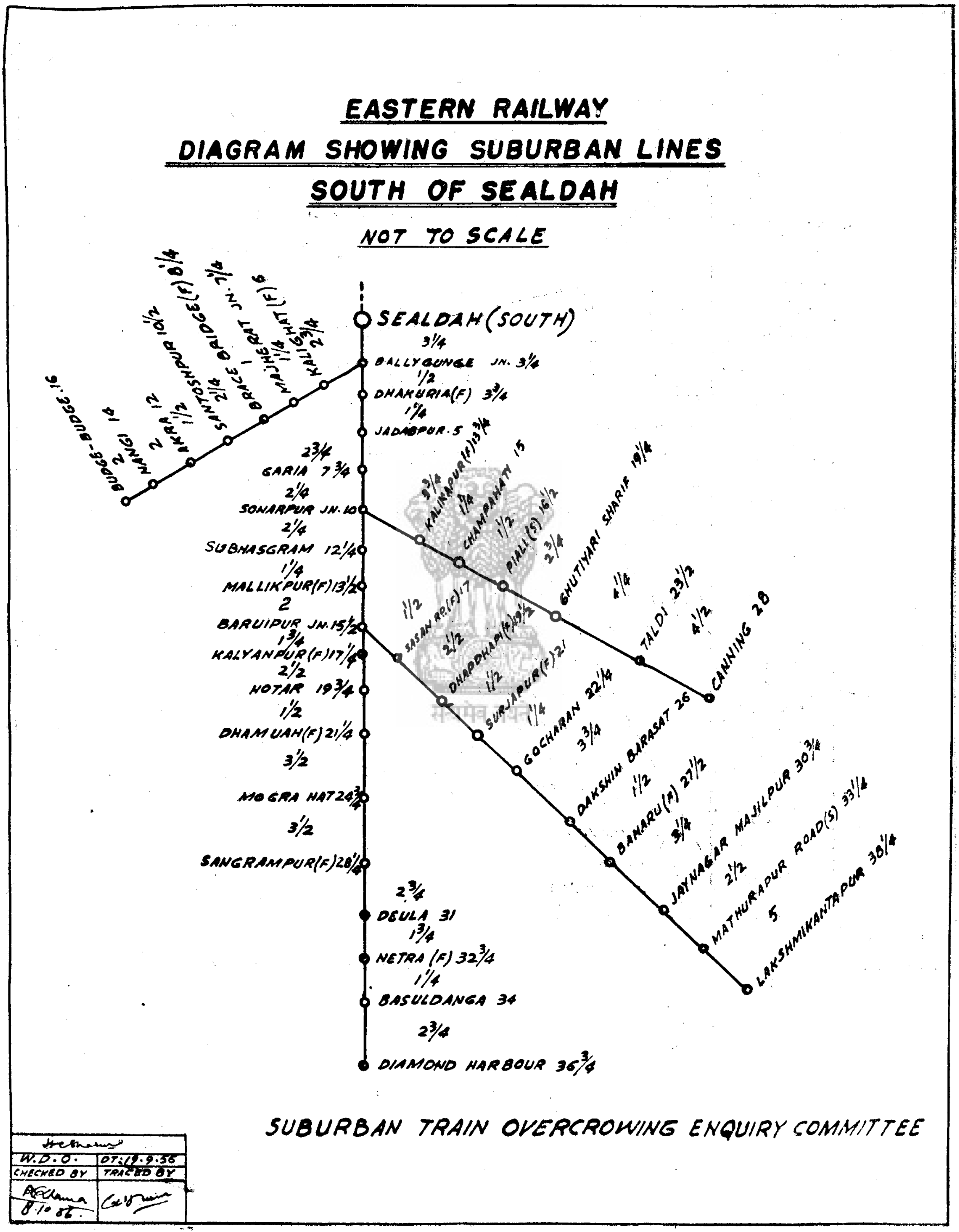
CALCUTTA SUBURBAN RAILWAY SYSTEM

NOT TO SCALE

SUBARBAN TRAIN OVERCROWDING ENQUIRY COMMITTEE

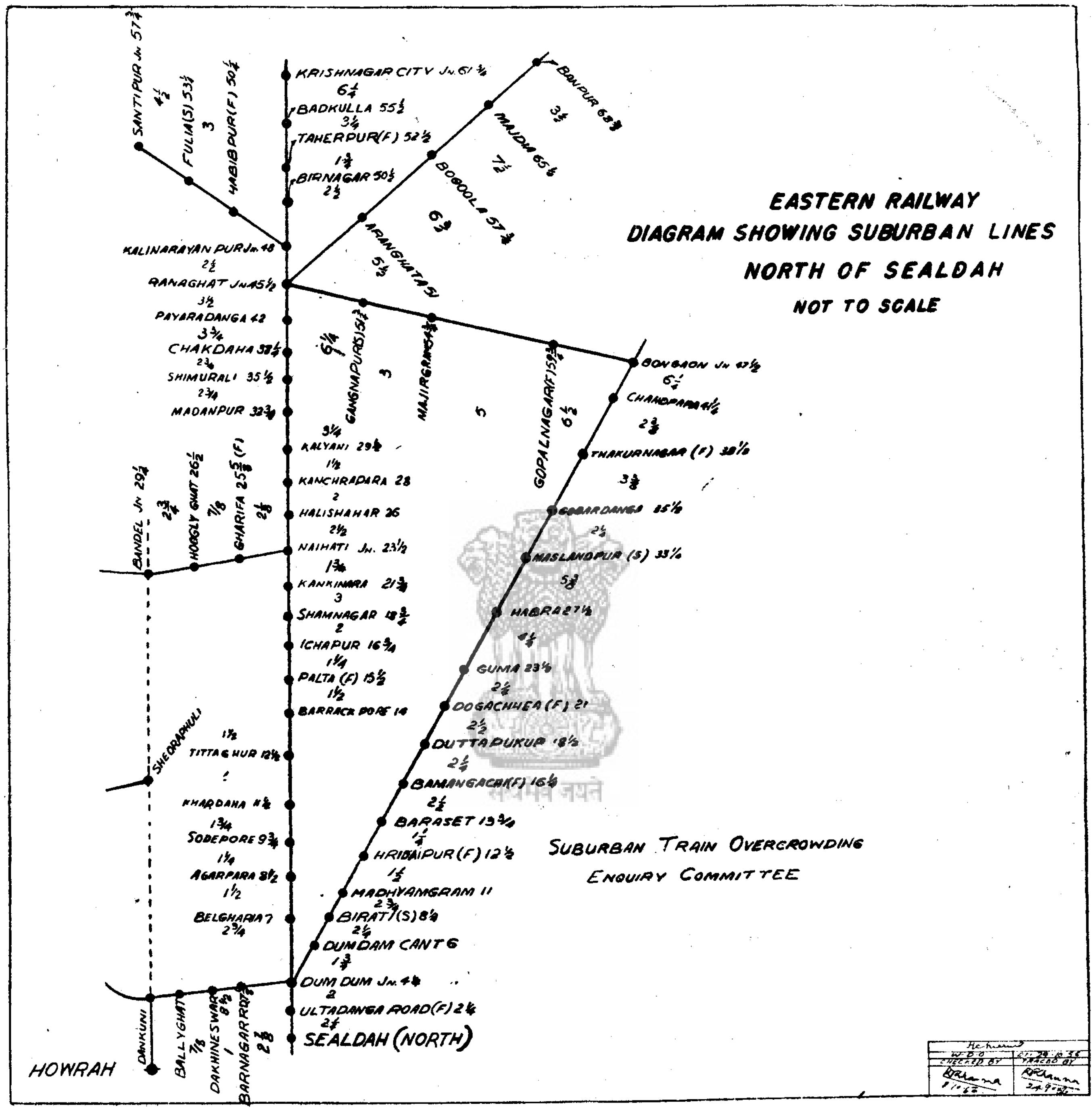
ANNEXURE 5

Line diagram of the suburban sections south of Sealdah



ANNEXURE 6

Line diagram of the suburban sections north of Sealdah

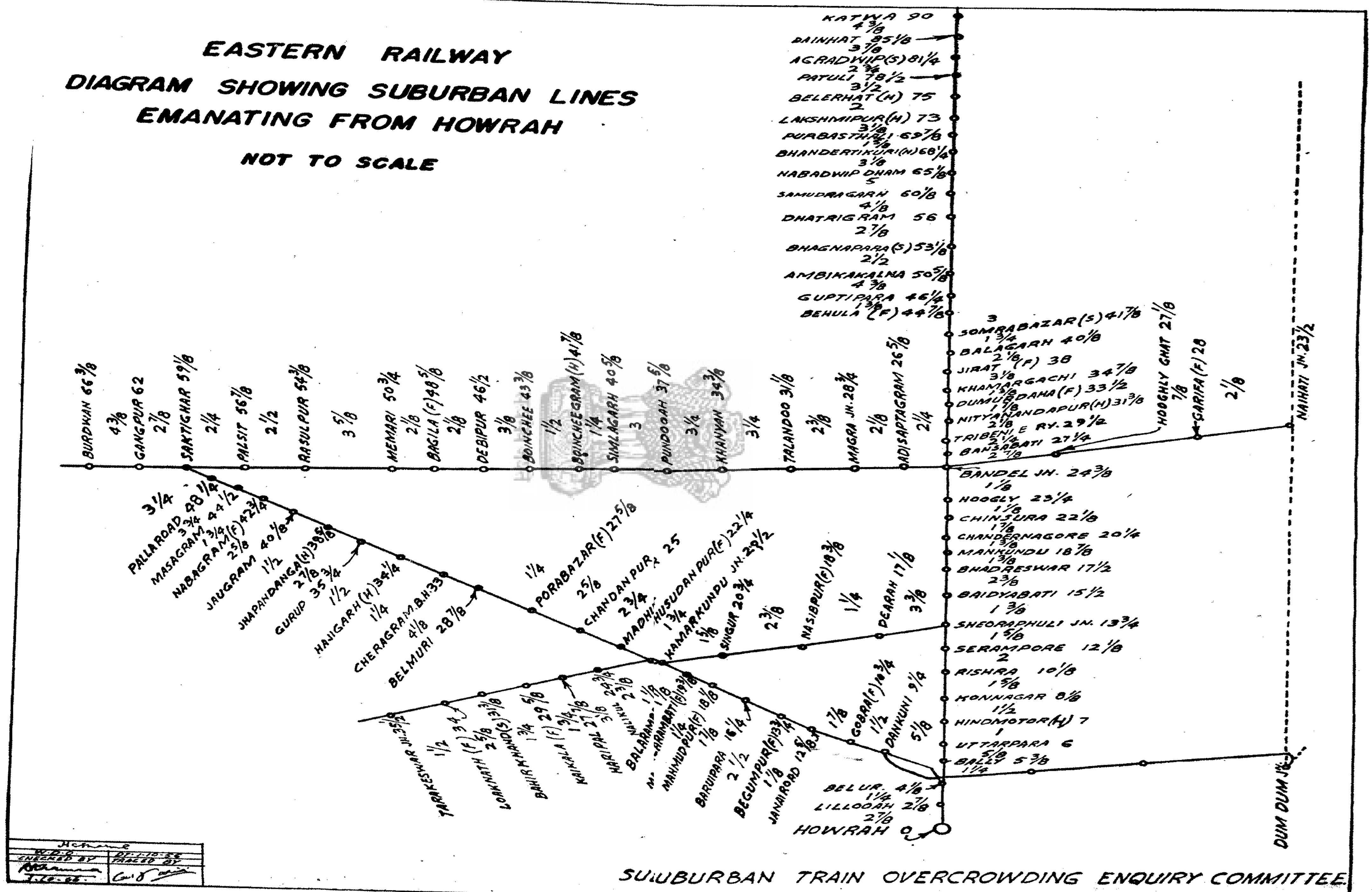


[redacted]ons emanating from Howrah (Eastern Railway)

EASTERN RAILWAY

DIAGRAM SHOWING SUBURBAN LINES EMANATING FROM HOWRAH

NOT TO SCALE

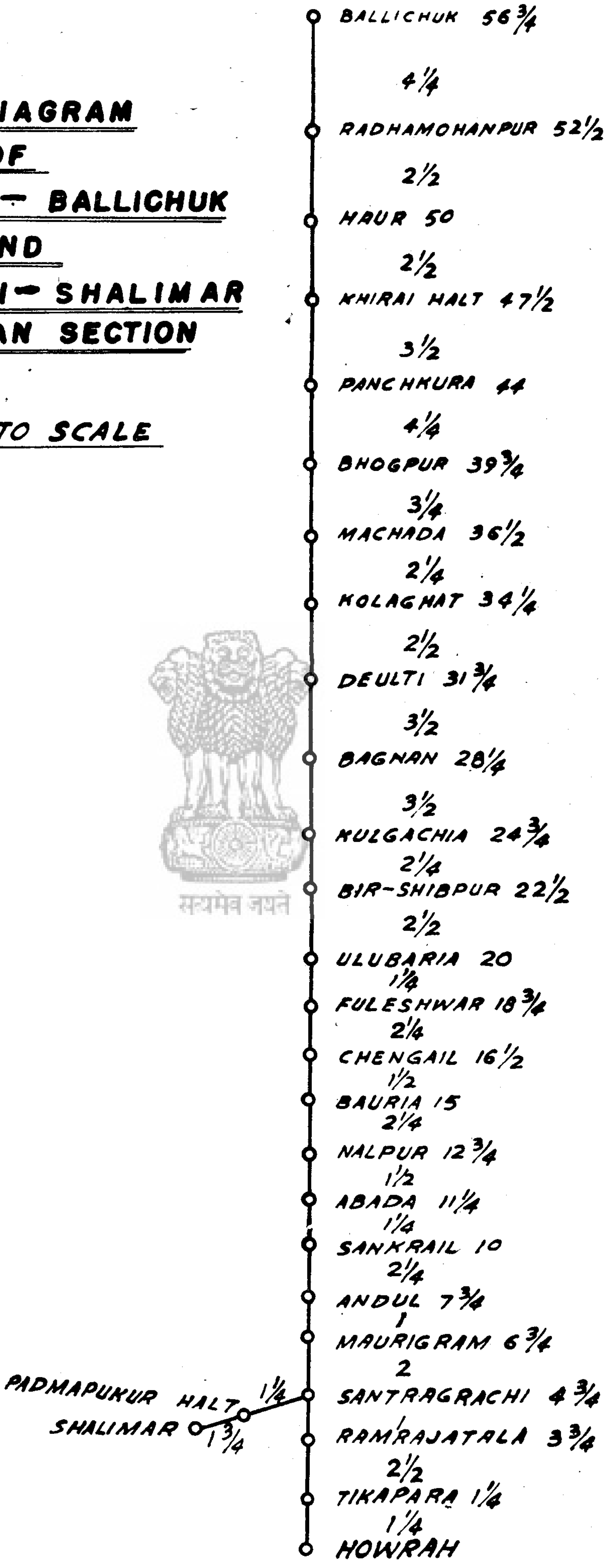


SUBURBAN TRAIN OVERCROWDING ENQUIRY COMMITTEE

SOUTH EASTERN RAILWAY

LINE DIAGRAM OF HOWRAH – BALLICHUK AND SANTRAGACHI – SHALIMAR SUBURBAN SECTION

NOT TO SCALE



H.C. Sharma

SUBURBAN TRAIN OVERCROWDING ENQUIRY COMMITTEE